

SECONDARY TEACHER FORECASTING: A CONSIDERATION
OF SUBJECT SPECIALITIES AND OTHER SELECTED ASPECTS.

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BY

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ABSTRACT

Inquiries into teacher supply and demand have recently been undertaken at both State and national levels in Australia. A worsening surplus situation has been predicted for the primary and secondary sectors of most school systems - with a common response being to recommend quite severe reductions in teacher pre-service training intakes, in order that supply and demand may be brought into balance. Because teachers, more markedly in the secondary sector but also in the primary sector, are regarded by employing authorities and training institutions as specialists in one or more subject areas, it was considered that supply and demand forecasts would be most useful for planning purposes if they could be cast at the level of each subject speciality.

The type of forecasting model used in the inquiries and also used on a more regular basis by educational systems, has appeared as a fairly rudimentary device, capable of making only the broadest responses to possible changes in policy and other educational variables.

Accordingly, the teaching situations in a sample of secondary schools in the Tasmanian Department of Education have been analysed for each of the years, 1978, 1979 and 1980. The nature of data collection and analysis has been determined by two general aims. These were:

- (i) to develop a statistical basis and appropriate mechanisms, to allow the current supply and demand planning model used by the Department to take a detailed account of the subject specialities of secondary school teachers;
- (ii) to assess the state of a select range of school and educational conditions and, where appropriate, to take into consideration in a supply and demand context, possible changes in these conditions.

(iv)

Following the development of a subject specialist forecasting methodology, the issue of secondary teacher subject specialisation has been extended to include a consideration of various other related aspects. For example: the relationship between the nature of pre-service training and subject teaching duties upon appointment to schools; and the establishment of data-bases to assist in the annual allocation of specialists to constituent schools.

In addition, the following aspects of the Tasmanian secondary system have been investigated:

- (i) the pupil-teacher ratio and its relationship with class size;
- (ii) teacher loadings, particularly the impact of specified loading reductions upon teacher demand projections;
- (iii) teachers' age and experience, particularly the impact of possible future changes in retirement rates and long service leave entitlements upon teacher supply and demand;
- (iv) size of schools, particularly the impact of smaller schools upon the central issue of secondary teacher subject specialisation;
- (v) 'pupil-periods' (the joint measure of pupil enrolments per subject and the portion of the school timetable devoted to the teaching of each subject), which were advanced as the basis of a possible alternative subject specialist demand planning methodology.

Major findings in each of the above areas have been presented - as has a list of recommendations for further study within the general area of teacher forecasting.

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INTRODUCTION

1 SUPPLY AND DEMAND FORECASTING AND TEACHER SPECIALISATION

In 1976, the Australian Education Council (AEC) established a Working Party to investigate likely teacher supply and demand developments in Australia. Using a forecasting model that has been and continues to be widely used overseas, the Working Party presented in 1978, sets of supply and demand estimates at both State and national levels¹. It was concluded that barring major disruption of existing trends, Australia would by 1985 face a sizeable teacher surplus in nearly all States, at both primary and secondary levels. It was expected that nationally, there would be an over-supply of approximately 20-40% of requirements, for each of the primary and secondary areas.

An immediate response to actual and anticipated teacher surplus, has been the call for reductions in entry quotas to teacher training institutions, to achieve after a three or four year time lag, a more desirable balance of supply and demand. Hence the Federal Minister for Education has predicted that teacher training positions in Australian colleges and universities will drop to 15,000 by 1982, representing a fall of 37% from the 1975 levels; and that further reductions are likely to occur, at least until 1985². In its report of October 1979, the Tertiary Education Commission confirmed this prediction, having estimated that the 1987 trainee-teacher intake would need to be around 14,070, if supply and demand were to be kept in broad balance³.

Reductions in pre-service training have already occurred. As

part of a general decline in pre-service enrolments since 1975, new trainees in 1979 numbered 16,915 - representing a decline of almost 30% over this period⁴. Considering the extent of dependence of the tertiary education sector upon teacher training as a source of student intake, and thus of funding, the impact of further reductions will be immense. (Over 50% of the graduates from colleges of advanced education enter the teaching profession. Approximately 15% of university enrolments are trainee teachers - including more than 40% of Arts students and about 25% of Science students⁵.)

The AEC Working Party however, stressed that its approach relied upon a number of assumptions not fully tested in State and/or national contexts; and secondly, that any response to the resultant estimates, needs to allow for certain limitations in the scope of the model. Foremost amongst these is the failure to consider the problem of teacher specialisation, a limitation most pertinent to the secondary education area.

Teacher specialisation can take numerous forms. It initially occurs when an intending teacher decides which broad category of education to enter: i.e. whether primary, secondary, technical and further education or the service branches. Many teacher models, including that of the AEC, limit their recognition of specialisation to this level.

Further specialisation is possible within each of these major categories: in the primary sector for example, a teacher may be involved in the pre-school/kindergarten, infant or post-infant areas; in the secondary sector there is a fairly common distinction between the junior and senior levels. Particularly in secondary education - although also to an extent in primary - there is a further degree of specialisation, whereby most teachers by virtue of personal interests, course of training, and/or teaching experience, become regarded as specialists, usually in one or two major subjects.

It was explicitly in reference to this latter form of specialisation, that the Working Party recommended the need for further information and research. It is also this form of specialisation which forms the initial focus of this report.

As has been noted by numerous educationalists⁶, not the least by spokesmen for teacher federations, it makes little sense to talk of teacher surplus, and even less to prepare responses, if at the same time there exist shortages, both in certain educational sectors and in subject areas within a given sector. In 1980 for example, despite the teacher surplus in that State, the Victorian State Education Department, in an attempt to overcome a severe shortage of secondary Technical specialists, was reported to have seriously considered an overseas recruitment program⁷. As a further example, it has also been reported that the surplus of teachers in Victoria, New South Wales and Queensland, has been accompanied by an ongoing shortage of Mathematics and Science specialists⁸.

From a different angle, the Tertiary Education Commission has recently expressed concern that any response to teacher supply and demand imbalance, should not impair the long-term functioning of training institutions⁹. Sharp and sudden, year-to-year fluctuations in student intake for example, need to be avoided. This policy entails that in any given year, some measure of surplus or shortage, or both, will need to be tolerated. The strategy proposed by the Commission, whereby school systems could cope with such a situation, is to enable teachers in areas of over-supply to be retrained in areas of shortage - thereby enabling teachers to shift between educational sectors, and between specialities within sectors.

It is argued that if teacher forecasting models can be extended to incorporate wholly or partly a consideration of teacher subject specialisation, their value as planning instruments would be greatly enhanced. Although the tertiary sector might not be totally protected from continued cut-backs in teacher pre-service enrolments, at least

the reductions could be planned from a more logical and systematic basis.

2 TEACHER PLANNING AND SUBJECT SPECIALISATION

There also exist planning tasks occurring at the level of the individual educational system, the fulfillment of which would be appreciably facilitated if data about teacher subject specialities were available.

Whereas their specific nature may vary somewhat across systems, two broad aspects emerge:

(i) for those systems maintaining a pre-service studentship training scheme, it becomes a vital task both in the initial selection of trainees and in the counselling services provided during their training, to anticipate system recruitment needs in each specialist area; and if necessary, to reconcile trainees' subject interests with system needs. These reconciliations are important not only to the system and to newly-graduated teachers, but also to the training institutions - as trainees' fields of specialisation may determine the nature of the training course selected, the duration of training, and the type of institution attended.

These aspects are largely relevant also to systems which do not operate a studentship scheme. It is still necessary for example, to estimate recruitment needs per subject area, and to maintain liaison with training institutions to ensure an adequate flow of appropriately trained graduates;

(ii) at least annually, usually towards the end of a school year, it becomes necessary for a system to undergo a detailed stocktaking in regard to its personnel resources, in order that allocation of staffing for the succeeding year may be planned. Teachers on hand, anticipated losses, available recruits, and likely extent of teacher

transfers are all components of this exercise, which must be pitched ultimately at the level of each subject area within each individual school.

3 PROBLEMS IN FORECASTING THE SUPPLY AND DEMAND OF SUBJECT SPECIALISTS.

In commenting upon the lack of consideration it was able to give to subject specialists in its analysis, the AEC Working Party mentioned that only two State or Territory education authorities were able to provide even basic information in this area¹⁰. Despite the importance of the issue, this absence of information - at least on any systematic basis, fully underpinned by adequate statistical data - is not difficult to understand.

Until only most recently, the overwhelming demand placed upon most Australian education systems was to cope with ever-expanding pupil enrolments, in which battle a wide array of tactics were used: inter alia, heavy reliance upon bond-carrying studentship schemes; provision of crash courses in teacher training, often incorporating a lowering of qualifications necessary for entry to the profession; and extensive overseas recruitment. With most educational planning efforts being expended upon this problem, it might well have been that any analysis of near-universal teacher shortage into specific subject areas, was viewed as a research luxury to be deferred until less hectic times.

Also as a legacy of past recruitment crises, statistical and other analyses of the Australian and State teaching forces represent fairly recent developments, prompted in no small part by Commonwealth provision of funds and personnel. Even so, many educational authorities have yet to develop sufficiently comprehensive analyses of their workforces, to enable such reasonably precise tasks as systematic teacher planning at the level of subject specialities, to

occur. The increasing practice of transferring personnel statistics to automated data processing systems, is likely to lead to advances in this area.

Apart from associated operational difficulties, the development of subject specialist forecasting is initially confronted by at least one major conceptual problem - the task of definition of 'subject speciality'.

The assorted difficulties are least obvious, when definition is made in terms of nature of pre-service training. Secondary teacher training courses commonly equip graduates, either with one main speciality and a minor support subject, or with two major specialities. Although this consequently leads to a sizeable number of different subject-combinations to be considered, it remains a relatively straightforward task to match supply options with demand openings. The major weakness is the assumption that upon placement in schools, teachers will be active only in those subjects appropriate to their training - an assumption which for most if not all systems, remains untested.

A second more pragmatic means of treatment, simply equates a teacher's specialities with those subjects in which he or she is active in an instructional context. This approach, whereby the number of specialists in a given subject is effectively a head-count of all teachers involved, lends an understandable flexibility to planning. However even without considering the necessary distinction between subject involvement and subject expertise, the sheer number of different subject-combinations likely to be found in a given system - conservatively, well over 100 - makes this approach extremely cumbersome to apply in any systematic sense.

Another method is hinged upon the administrative structures which are found in some secondary systems. A teacher following recruitment is, according to course of training, assigned to one of a dozen or so

subject departments; both in initial appointment to a school and in all later movements, unless formally transferred to another subject department, that teacher is regarded as essentially a full-time specialist in the given subject. (The teacher's extent of involvement in other subjects once appointed to a school, remains at the discretion of the school principal, but is usually intended to be at most, only a very small component of overall loading.)

This approach if correctly administered, ensures a fairly close compatibility between nature of training and actual subject involvement. Further, it has the commendable advantage from a planning viewpoint, of attempting a close concurrence between total full-time equivalent numbers of subject teachers and head-counts of all teachers per subject.

A major limitation in defining a specialist in terms of the subject department assigned, is simply that many secondary systems currently lack such administrative structures. For most State departments: a teacher is appointed to a particular school, perhaps having only the broadest recognition of his or her subject specialities; at this school he or she is then given a teaching load across some number of subjects, perhaps compatible with training or previous experience; within the school administration, the teacher is consequently shared between some number of subject head teachers, according to the nature of teaching load. Within this general structure, there are often wide discrepancies between full-time equivalent teacher demand in a given subject, total number of teachers involved in that subject, and the actual number of recognized subject specialists.

One further limitation in this administrative approach is that, particularly in smaller schools, a rigid observance could well lead to difficulties in providing staff for all subject areas. In many instances, either there will be needed an increased provision of teachers to ensure that all curriculum options will be taught by

specialists only, or teachers will be required to teach to some appreciable extent beyond their specialities, or the range of curriculum offerings will need to be reduced.

4 AN APPROACH TO FORECASTING THE SUPPLY AND DEMAND OF SUBJECT SPECIALISTS.

It is proposed to analyse the teacher situation within the Tasmanian State Education Department, with the following initial aim in mind:

to develop a statistical basis and appropriate mechanisms, to allow the current supply and demand planning model used by the Department to take a detailed account of the subject specialities of secondary school teachers.

The notion of subject specialisation to be used in this regard, has been functionally defined thus: the tendency for teachers to be active commonly in one or two subjects only, and for those subjects to be largely unchanged year to year.

The very close operational similarity that exists between the Department's model¹¹ and those used by the AEC Working Party, and more recently, the Tertiary Education Commission¹², means that the former also largely fails to consider the issue of subject specialisation. While the Department's teacher planning does of necessity recognize the issue, it is able to do so only from a fairly informal basis, by relying upon the experience and judgement of individual officers. It is intended that the proposed analysis will firmly incorporate a systematic approach to teacher specialisation, within the structures of the Department's present planning model.

The similarity between the three models, further means that the proposed methodology will also be largely applicable to the AEC and

Tertiary Education Commission instances. Again, it is stressed that this methodology is not intended to replace the current supply and demand models - rather, to provide complementary mechanisms aimed at yielding supply and demand estimates, per subject.

The development of subject teacher demand estimates will be based upon the number of teaching periods in school timetables allocated to each subject, existing within Departmental high schools, district high schools, and matriculation colleges, over the years 1978-1980. For a given school, each subject number of periods will be expressed as a ratio of the average number of periods taught by all teachers within that school, to yield the number of subject specialists required, had supply sources, staffing policies, and other factors so allowed.

The provision of subject-specific supply estimates will be based upon the premise that those teachers involved in each subject 1978-1980, were specialists in those subjects, regardless of training or expertise. Consequently it will be assumed that the loss of any of these teachers due to resignation etc., will entail the recruitment of other specialists - with specialisation in this instance, being anchored to nature of pre-service training.

5 OTHER SELECT ASPECTS OF TEACHER FORECASTING

A second aim of the report will be:

to assess the state of a select range of school and educational conditions and, where appropriate, to take into consideration in a supply and demand context, possible changes in these conditions.

The approach to secondary teacher demand, shared by the AEC, Tertiary Education Commission and Tasmanian models, consists of only two components: pupil enrolment projections and anticipated

pupil-teacher ratios. The traditional justification for the latter, is that it acts as an index of average class size - a point to be discussed in detail in a later section of the report. What is worthwhile noting at this point, is that the impact of changes in staffing standards is determined by many factors and conditions in an educational system - the relationship with these aspects being at best vague, often unknown.

The following variables, for example, are all capable of influencing classroom conditions and consequent teacher demand estimates:

- (i) size of schools - with some systems, including the Tasmanian Department of Education, attempting to reduce the maximum allowable size of schools, it is possible that resultant developments will mean higher teacher numbers, if the range of curriculum options is not to be reduced and if teacher subject specialisation is to be maintained;
- (ii) teacher loadings - increased emphasis on in-service education in its various forms, including induction procedures for first year teachers, could lead to reduced loadings and the need for increased replacement personnel;
- (iii) teacher characteristics, age and experience - perhaps because of the relatively high unemployment rates currently prevailing, teacher resignations over recent years have fallen dramatically. The consequences include teaching forces, the members of which are older and with longer employment records. This development not only suggests the need for a reconsideration of teacher retirement projections in a supply context, but also has possible implications for long service leave incidence and for consequent staff replacement.

Any precise consideration of such factors, and any changes in them, is absent from all three models discussed to this point - with only the gross pupil-teacher ratio being open to significant manipulation. The recent Report of the Committee of Inquiry into Education and Training (the Williams Report), for example, has recognized the inadequacy of the pupil-teacher ratio as an index of

conditions in an educational system. It recommended that future AEC forecasts "be presented in such a manner that the sensitivity of the forecasts to policy variables such as class sizes and average hours of teaching, can be assessed"¹³. The proposed development to enable a consideration of teacher subject specialities, lends these factors an even greater significance.

Analysis of the above and other factors, will be restricted to the Tasmanian secondary school system. The extent to which the specific findings consequently yielded, will be applicable to other States' systems and to the national situation, remains open to question. However, it is hoped that the resultant information might at least provide a starting point to future cross-system and composite studies.

FOOTNOTES

- ¹ Report of the Australian Education Council Working Party, The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985, A.G.P.S., Canberra, 1978.
- ² As reported in: 'The Australian', no. 4841, 26-27 January 1980, p6.
- ³ Tertiary Education Commission, Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s. Unpublished paper, circulated October 1979.
- ⁴ Ibid.
- ⁵ Statistics cited in: Anderson, D.S., 'Some implications of the reduced demand for school-teachers'. Paper delivered at a conference, Australian Education in the Aftermath of Expansion, sponsored by the Education Research Unit and the Office for Research in Academic Methods, Australian National University, Canberra, July 1978.
- ⁶ Burkhardt for example, argues the need to refer separately to the employment markets for each subject speciality. "It may be that there is a 'surplus' of economics teachers ... (while) teachers of music and art ... may be in 'short' supply ... In this sense it is logical to refer to 'the market for music and art teachers' as opposed to that for economics teachers." (Burkhardt, G., 'Planning teacher supply - an accountability issue'. Paper prepared for the Sixth National Conference for Educational Administrators, Perth, August 1979, p6.)
- ⁷ As reported in: 'The Australian', no. 4897, 2 April 1980, p13.

- 8 A statement made by Dr. B. Carss, Dean of the Faculty of Education, University of Queensland - as reported in 'University News', no. 157, 24 September 1980, p1.
- 9 Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.
- 10 The Supply of and Demand for teachers in Australian Primary and Secondary Schools 1978-1985.
- 11 For details of the model, see: Education Department of Tasmania, Research Branch, Teacher Education: Estimate of Required Recruitment to Departmental Studentships 1979-1987, prepared May 1979.
- 12 As detailed in: Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.
- 13 Report of the Committee of Inquiry into Education and Training, Education, Training and Employment, (the Williams Report), A.G.P.S., Canberra, 1979.

CHAPTER 1

TEACHER SUPPLY AND DEMAND FORECASTING

1 BRIEF HISTORY OF NATIONAL TEACHER FORECASTING

As noted in the Williams Report, one of the most remarkable features of the teacher surplus estimated by the AEC Working Party, is that it has taken so long to be discerned¹. Although such a statement ignores a small number of early forecasts², it is easy to find sympathy with it. In 1974 for example, the supply situation in Australia was deemed to justify some 6,000 teachers being contracted from overseas, to work mainly in Victoria and New South Wales³. In May 1975, the Universities Commission reported that "forecasts of the supply of and demand for teachers in Australia as a whole indicate that ... an overall surplus of teachers is unlikely for some time"⁴. The situation two years later, formed the basis of the AEC Working Party report⁵.

The short warning period may be directly attributed to the brief history of Australian teacher forecasting at a national level.

Putting aside the contributions of a small number of individual researchers, early attempts on a national scale have usually appeared only as a small component of a much larger exercise. For example, the Special Committee on Teacher Education appointed in 1972 to report to the Australian Commission on Advanced Education, as part of its functions drew in data from most State systems to provide an outline of projected national teacher needs⁶. The projections however, were restricted to assisting in the allocation of Commonwealth funds to

training institutions - and within the report, received little analysis in their own right.

Before the AEC study, earlier work within the Commonwealth Education portfolio was restricted to two instances.

(i) In 1974, W.J. Weeden, under the auspices of the Schools Commission, prepared national estimates of trends in teacher supply and demand up to 1985⁷.

As the resultant report remains unpublished, full details of the methodology used have not been obtainable. However it does seem that base data were supplied by the State Departments of Education only, whereas consequent assumptions were applied to State and non-State systems alike. It further appears that the forecasting model was comparable with that used by the AEC Working Party, except that the study was not limited to the primary and secondary sectors - but attempted to include pre-schools, special schools, technical and further education institutions, and service branches.

In brief, Weeden projected that by 1985, there would be a total surplus as high as 55,000 teachers. At primary level, the surplus was expected to be around 33,500, and at secondary level, around 21,500 teachers - levels in keeping with those expected by the AEC. On the basis of information available at that time, it was considered impossible to quantify the situation pertaining to those sectors other than the primary and secondary, and to quantify the inter-relationships between all sectors.

(ii) In the following year the Commonwealth Department of Education and Commonwealth Education Commission undertook what was essentially a revision of Weeden's work, based upon updated statistical information⁸. The consequent report, completed in 1976 - circulated once more on a restricted basis - reached essentially the same conclusion: that substantial surpluses of both primary and secondary

teachers were in immediate prospect, regardless of any reasonable moves that State or Federal Governments might make to improve staffing levels.

Following the AEC Working Party report, inquiries have been initiated by most State governments⁹. Although some of the specific assumptions made, and conclusions drawn, by the Working Party have been called into question¹⁰, the likelihood of a teacher surplus has not been challenged. The common response has been to recommend reductions in intake of pre-service training courses - reductions usually of the order of 20-25% of 1978 levels, although occasionally 40% and higher.

Despite a recommendation from the Williams Committee to the contrary¹¹, the AEC Working Party was disbanded in February 1979. The responsibility for teacher supply and demand forecasting was handed, at least in part, to the Tertiary Education Commission - which released its first, consequent report in late 1979¹².

The model used by the Commission is similar to that of the AEC, except for one significant difference in a supply context. No attempt has been made to estimate the total future output of training institutions, based upon projection of present enrolment trends. The Tertiary Education Commission approach attempts to regulate the supply of new graduates, in order that supply and demand may be kept in balance. Accordingly, the final estimates produced by the Commission were sets of appropriate pre-service intake-levels - rather than absolute estimates of teacher shortage or excess.

2 A DEMOGRAPHIC AND SOCIAL BACKGROUND

The following discussion relates to past, present and projected teacher supply and demand trends at a national level. Although specific statistics may vary, the impact of the demographic and social variables as outlined below, is also largely pertinent to the situations of individual States.

(A) Teacher supply and demand until the mid-1970's.

"A few years ago, the position (in regard to teacher supply and demand) was fairly clear; in the 1950's for example, we in Australia were recruiting our teachers from the age cohorts of those who were born in the late 1930's. Those were the years when confidence in the future of Australia was relatively low: and in that period births totalled only about 110,000 a year. But ... the children, whom these teachers were to teach, came from cohorts which were more than twice as large. The total number, for example, of the annual cohorts of children born in 1960, numbered about 230,000. Thus there were harsh and inescapable limits to the number of young people who could be recruited for teaching each year."¹³

The consequences of the post-war change in birth-rates were further compounded by social, economic and educational circumstances. Increased migration into Australia and higher retention rates at the upper extremes of secondary education, intensified the demand for teachers at a time when there were frequently general social and educational pressures to improve, rather than just maintain, classroom conditions and staffing resources. For much of the period, the situation was further exacerbated by a widespread shortage of qualified manpower, which produced numerous alternative career

openings for teachers. There were consequently high teacher wastage rates, adding to the heavy recruitment needs.

The analyses undertaken by Borrie¹⁴, provide perhaps the best-accepted demographic explanation of teacher supply and demand developments. In addition to describing the interplay between the low birth-rates of the 1930's - the 'deficit' cohorts - and the post-war baby boom, Borrie points also to changes in marriage patterns. Due to a very sizeable increase in marriage rates, together with changes in family-building practices, an increasing proportion of young women, at least until most recently, withdrew from the workforce during their early twenties, for family-raising purposes.

"While modern family-building practices in Australia mean that on average only about seven years are spent in the process of reproduction ... and that therefore there is increasing opportunity for women to return to the workforce in early middle-age, this backflow has been more than off-set by the volume of withdrawals from the workforce of younger women, not so much upon marriage as upon pregnancy."¹⁵

These trends were seen by Borrie and others, as contributing directly to the recruitment difficulties faced by nearly all Australian educational systems, until the mid-1970's.

Following the fall in national birth rates that occurred during the 1960's, and as the products of the baby boom percolated through the school and tertiary educational systems, it appeared that the crises in teacher recruitment prevailing in the early and mid sixties, would be relieved. By the early 1970's, teacher supply and demand were moving towards a state of balance.

Social developments existed side by side with demographic trends. "Nor are these (demographic conditions) the only changes; the salaries and conditions of teachers in the State, and in the non-State, schools have steadily improved, and ... there

has been a gradual change in the attitudes of the community as a whole such that teaching is held in appreciably higher regard than it was a generation ago. Teaching, too, is clearly an occupation which offers considerable security; and it is, therefore, relatively more attractive in times of economic uncertainty"¹⁶

The pursuit of an expanding pupil enrolment, coupled with social and educational developments, has meant that the Australian teaching force has undergone steady growth¹⁷. The total number of teachers employed in primary and secondary schools has grown on average, 5 per cent per annum for over 20 years. Total teacher employment in 1977 stood at 175 thousand, or 2.8 per cent of the labour force - compared with 2.2 per cent a decade earlier, when teacher numbers were around 104 thousand. This increase has considerably outpaced the growth in pupil enrolments, as reflected in lowered pupil-teacher ratios. In 1966, for example, the national combined primary-secondary pupil-teacher ratio was 24.1; by 1977 it had fallen to 17.1.

The growth of the national teaching force was made possible by rapid post-war tertiary education expansion, partly as a response to past shortages of qualified manpower in almost all professional and technical areas. In 1949, the national university enrolment totalled 31,753 students, and by 1977 had grown to 158,411 students. In 1963, 49,420 students were enrolled in non-university tertiary education - compared with the 1977 college of advanced education enrolment of 140,312 students. Enrolment growth has been proportional as well as absolute: in 1955, the total tertiary enrolment was equivalent to less than 8% of persons aged 17-22 years, whilst in 1977, enrolments were equivalent to almost 20%¹⁸.

As a participant in this expansion, teacher training institutions and faculties produced a growing output of students, reaching a probable peak in the late 1970's.

(B) The teacher supply and demand situation, mid-1970's to 1980.

By the mid-1970's, teacher shortage was becoming a feature of the past. Again, demographic factors contributed to a discernible swing towards an impending teacher surplus in most systems.

The post-war baby boom is customarily described in terms of fertility rates rather than actual birth numbers. Although it is generally agreed that the boom ended in the early 1960's, the national birth level, after reaching an early peak in 1961, did not reach its highest point until 1971. Since that year, it has fallen considerably, with the number of live births in 1978 being some 80% of the 1971 number¹⁹.

Fluctuations in the number of births over the past two decades, have had an understandable impact upon school enrolment levels - although the exact nature of impact has often been obscured by changing participation rates, particularly at the lower and upper extremes of schooling. As a consequence of the latest birth trends, the 1980 national primary enrolment is at or near its highest-ever point, with an estimated, approximate seven-year decline imminent. Secondary enrolments have just entered what is anticipated to be one or two years of decline, to be followed by a steady climb until around 1986²⁰.

As remarked by Anderson:

"the effect of this demographic downturn on ... (teacher recruitment) would not have been too drastic if retirements at 60 or 65 were more or less proportionate to intakes and if movement in and out of the (teaching) service ... was in balance. These conditions, however, do not hold due to the massive recruitment of young people into school teaching during the last twenty years causing the age profile of the profession to be markedly skewed. The average age is under 35, and more than half are under 30. Thus retirement at the

end of service is much lower than if the age distribution was uniform. Furthermore, the resignation rate of younger teachers has dropped sharply, and applications from experienced teachers for re-entry to the service has increased sharply"²¹.

In addition to the reduced retirement rates mentioned by Anderson, the Tertiary Education Commission has offered three further causes for the fall in wastage²²:

- (i) State studentship training schemes have been almost entirely phased out. As the schemes had allegedly attracted some students with no firm commitment to teaching, many of the latter consequently sought alternative employment after little or no teaching service;
- (ii) the present surplus is discouraging teachers, particularly females, from leaving employment, because of anticipated re-entry difficulties;
- (iii) alternative employment opportunities have contracted sharply.

In addition to demographic and wastage factors, Burkhardt points also to a change in the social and economic contexts, as a partial explanation for the actual and threatened surplus.

"In the period 1950-1970, education was viewed nationally and internationally as an important factor in social reform and the eradication of social inequalities. Investment in education was linked with the pursuit of economic growth and social welfare policies. The period 1970-1979 has witnessed a disenchantment with the education industry's attempts to achieve all its economic and social expectations." ²³

An immediate consequence is a somewhat sceptical attitude towards the benefits of increased funds and personnel being devoted to this area.

It needs be conceded that the above depiction represents a simplified view of the development of the present teacher surplus. For example, the tertiary education expansion, whilst contributing to a teacher surplus, has to a lesser extent, caused an increase in

secondary teacher demand. In conjunction with other factors, increased tertiary education participation has of necessity, entailed increased secondary retention rates, with the retention rates Grades 7-12, having risen from 23% in 1967 to 35% in 1978²⁴. Given the relatively low pupil-teacher ratios at the upper extremes of education, there has been a consequent disproportionate increase in teacher demand²⁵.

(C) The future teacher supply and demand situation.

It may be seen that to this point, within a teacher forecasting context, the consequences of the so-called baby boom are two-fold:

- (i) the first impact made by those born within this period was as pupils. As they passed through the school ages, they occasioned a rapid and dramatic expansion of educational facilities - including a marked increase in the demand for primary and secondary teachers, at a time when local recruitment sources were very limited;
- (ii) the second impact was, and is still being made, as teachers. As those born in the period stretching between the late 1930's and early 1960's, have proceeded to tertiary education in unprecedented numbers and proportions, they have formed - and threaten to continue to form - teacher pools of such size that it seems many will be unable to work in their chosen field.

The products of the baby boom have at least one more impact to make upon educational systems - this time, as parents.

Despite a steeply declining fertility rate and falling birth numbers since 1971, Caldwell expects the latter at least, to undergo a strong recovery in the immediate future. He attributes this almost entirely to the numbers of baby-boom children now coming into parenthood.

"This sustained fall will probably reach a trough - a rather spectacular one - in the late 1970s with around 10 per cent

fewer births than in the early 1970s. The population's age structure - still arising from the baby boom years (with the help of an assumed slight recovery in fertility levels), will cause a rise in births of perhaps 10 per cent and 7 per cent in two successive quinquennia. Thereafter change is slight." ²⁶

It is this fifteen-year period of oscillation in birth numbers - i.e. in Caldwell's chronology, 1976-1981 and 1981-1991 - that makes teacher planning difficult. Caldwell's data do not readily lend themselves to a translation into precise enrolment projections. However, by making assumptions about average annual birth numbers and about each age cohort's school participation rates, the following enrolment trends may be deduced:

(i) the projected fall-off in primary enrolments will continue until around 1987, at which point, the anticipated increase in birth numbers in the early 1980's will prompt a recovery. The extent of enrolment increase will be of the order of 2% per year, until well into the 1990's - whereafter, enrolments will tend to stabilize, perhaps to fall slightly;

(ii) given these expectations at primary level, then the secondary enrolment projections - allowing for a six or seven year time lag - will broadly follow pattern. From 1990 onwards, (the point at which Caldwell's projected birth data first assume relevance), the decline in secondary enrolments caused by the primary slump currently threatening, will continue until around 1994 - at which point enrolments will commence to recover, commensurate with the late-1980's primary recovery.

Accordingly, Caldwell warns against dismantling teacher training facilities. The surge in demand, occasioned by the impending recovery in birth numbers, "will be as big as that generated by the birth rates of the 1950s and 1960s, and, all other things being equal, would imply the same proportional increments to the teaching pool ... "²⁷. The extent to which training facilities and teaching forces are depleted

in pursuit of the present slump in births, will contribute directly to possible future staffing shortages.

The AEC Working Party has presented detailed teacher forecasts only until 1985 - but has also provided a longer-term perspective, reaching until the turn of the century²⁸. Caldwell's demographic projections as they pertain to this extended period, lend considerable support to several of the estimates made by the Working Party. Their primary and secondary enrolment estimates, for example, are in almost exact accordance with the enrolment pattern described above. A comparable statement may be made of the Tertiary Education Commission projections.

Neither the AEC Working Party nor the Tertiary Education Commission have emphasized the birth trough as the sole cause of present or anticipated teacher surplus. Nor is the problem seen as an absolute reduction of teacher demand. (If for example, the Working Party's assumption of improved pupil-teacher ratios is accepted, then combined primary and secondary teacher demand is expected to be always increasing over the period 1978-1985.) Rather, the problem remains as one of imbalance between demand and supply - i.e. while total demand may increase, the net growth of supply sources is expected to be greater.

Consider as an example, the extreme of teacher surplus estimated by the Working Party - approximately 40% excess at a national level by 1985, assuming constant staffing standards. Half of the surplus may be immediately attributable to the possible failure of educational systems to allow a continued improvement in pupil-teacher ratios.

The remainder of the surplus at one level at least, may be explained in demographic terms. In the twenty years immediately prior to 1977, the average annual expansion in the combined primary-secondary enrolment was almost 2.5%²⁹. Had post-1977 enrolments continued to grow at this rate, by 1985, teacher surplus

(assuming constant staffing standards) would have been reduced to about 15% above requirements. Had both enrolment growth and improvements in staffing standards occurred, a situation of teacher excess would have been converted to one of slight shortage by that year.

This explanation if exclusively pursued however, overlooks critical changes in teacher wastage and supply. During the early 1970's when supply and demand were near a state of balance, and when primary-secondary wastage was around 13.5% per year, the annual number of available recruits was equivalent to about 20% of each year's teaching force. Using the AEC data-bases³⁰, it may be calculated that for the period 1978-1985, somewhat reduced levels of recruits are expected. In 1985 as a specific instance, recruits from training institutions and from 'other sources' (excluding excess teachers from previous years) will be equivalent to 17% of the employed teaching force, assuming constant staffing standards. Assuming improved staffing standards, the number of recruits in 1985 would be equivalent to 15% of the teaching force of that year.

Despite the fall in recruitment levels, a surplus is still expected. The crucial element of change is the projected fall in teacher wastage to about 9.5% per annum, 1978-1985. Assuming constant staffing standards and excluding excess teachers from previous years, this will mean for 1977-1985, an estimated annual surplus as high as 9% above the total teacher establishment - and as mentioned, a cumulative excess of approximately 40% by 1985. Had wastage remained at 13.5%, the cumulative excess would have been more than halved. Annual excess in any year would not have risen above 5% - and for most of the period, would have been around 3%.

It is argued that despite the pronounced role of demographic variables, the cause of the present and projected teacher surplus must be viewed as multiple.

It is further argued that the above discussion is also largely relevant to the situation of most individual States' school systems. In this regard however, minor variations need to be recognized.

The Tasmanian situation, of special relevance to this report, may be thus instanced. The post-war expansion of primary and secondary education in Tasmania, closely parallels the national pattern - as do the underlying demographic and social variables, a minor point of difference being the earlier onset of the Tasmanian decline in birth levels. (Statistics covering the growth of the Tasmanian Department of Education secondary sector over the past fifteen years, have been provided in the following chapter.)

The main variation from national trends, concerns the extent of predicted teacher surplus in Tasmania. As detailed in the following chapter, recent inquiries into the Tasmanian situation suggest that for the next decade or so, supply and demand will be in a closer state of balance than for the nation as a whole. Notwithstanding these findings, Tasmania is currently experiencing a sizeable teacher surplus - with the decline in teacher wastage playing a relatively greater role in the State instance.

3 AN APPROACH TO TEACHER FORECASTING

(A) Background.

The AEC Working Party - consisting of representatives of each State Education Department, the Catholic school system, State co-ordinating authorities in advanced education, and of representatives of the Commonwealth Education Department and Education Commission - published its first report in 1978³¹. A revision was under preparation at the time of the Working Party's dissolution, with a progress report having been circulated in January 1979. Due to the confidentiality of the latter, the following discussion and statistics relate to the 1978 report. Unless otherwise acknowledged, the various points of forecasting contention raised in the discussion, have been derived from comments made within the report.

Rather than deal with specific supply and demand parameters, the main concern of this section is to describe and, at a preliminary level, appraise the forecasting approach used by the Working Party.

This particular approach has been selected for detailed consideration in preference to the Tertiary Education Commission³² and Tasmanian Education Department³³ models, because it presents a fuller depiction of supply and demand trends. Both of the latter in their supply estimates, attempt to regulate the output of training institutions by imposing demand projections as a ceiling to supply levels, whereas the AEC model attempts to assess the various supply sources, independent of demand.

This conceptual difference aside, the basic components of all three models, and even many of the underlying statistical assumptions used to work them, are very similar. Significant points of difference have been indicated throughout the following discussion.

Supply and demand estimates are customarily prepared separately for the primary and secondary educational sectors. The following discussion is limited to secondary teachers, but in most aspects is equally pertinent to the primary situation.

(B) Teacher demand.

The secondary teacher demand estimates provided by the AEC model, were determined by the following two components:

- (i) pupil enrolment projections; and
- (ii) expected pupil-teacher ratios.

Demand estimates were yielded by relating each year's projected enrolment level to the expected pupil-teacher ratio in that year.

(i) pupil enrolment projections

Enrolment projections were in most instances prepared by each State system (except for the Territories and for some independent school systems, where Commonwealth calculations were used).

As they will not be influenced by possible changes in birth rates until 1986, secondary enrolment projections can be regarded with more confidence than those at the primary level. However, there are two main sources of possible error.

Any significant change in national migration, as a result for example, of Federal government policy, would require a reworking of most systems' enrolment estimates. The Working Party considered that nationally, a change at around 8,000 in migration - compared with average annual levels of 42,000 net gain over the period 1974-1976 - would be 'significant'.

The other problem concerns the possibility of changing pupil retention patterns. In this regard, the current unemployment

situation is of prime importance, and is likely to have effect at two levels: at around the third year of secondary schooling as pupils reach leaving age; and at the transition to matriculation studies. While it is currently thought that high youth unemployment will serve to increase retention rates in these two areas, a number of State education systems have in practice found that some fall-off has occurred. Whether this will continue, or whether retention rates will revive, remains an open question.

The Tertiary Education Commission model attempts to overcome the latter problem, by providing two sets of secondary enrolment statistics - one assuming a continuation of present retention rates, the other assuming increased participation. By 1990, increased participation estimates were expected to be some 6% higher than 'constant' enrolments.

In all three models, the enrolment projections have been prepared separately for the primary and secondary sectors. As remarked by the AEC Working Party, the general division between 'primary' and 'secondary' is not always straightforward - a feature expected to intensify over future years.

"Already there are difficulties in such distinctions with areas such as special classes and schools, Aboriginal schools and rural schools. There are some areas where experimental enrolments (of upper primary students) in secondary schools are occurring. A similar blurring may soon occur with teachers as more secondary trained teachers begin to accept appointments to primary schools."³⁴

In regard to the accuracy of enrolment projections made in 1979, Turner delivered the following verdict.

"Until about the middle 1980's in the case of primary schools and until the end of the 1980's in the case of secondary schools, enrolments can be predicted with reasonable accuracy. Compared with the post-war decades

these enrolments are more remarkable for their relative constancy than for their variation." ³⁵

(ii) expected pupil-teacher ratios

AEC demand estimates for the period 1978-1985, were prepared according to two assumptions:

either the actual pupil-teacher ratio as at 1977 would be maintained over the period under analysis;

or, there would be a continued improvement on the 1977 standard, according to betterment targets nominated by each State.

The assumptions about improved pupil-teacher ratios occupy a critical position in the Working Party's demand estimates. However, as recognised in the report, sizeable caution needs to be used in their interpretation.

The first issue at question is the extent to which the improved staffing levels might be considered realistic. By 1985 at a national level, 11% reduction in the secondary pupil-teacher ratio was assumed. The Working Party concluded that:

"while these nationwide improvements appear to be impressive targets and may be optimistic, they can be achieved with a much smaller annual rate of improvement than has occurred over the last decade" ³⁶.

There remains however, the difficulty of forecasting with precision the degree of improvement that would occur by any given future year. Economic circumstances and government education policies are subject to change, substantially affecting the choice of targets and/or the rate of progress towards them.

"On one hand pupil-teacher ratio targets established in earlier ... (surveys) have often been achieved and the targets revised upwards, while, on the other hand, planned class size reductions in some States have had to be deferred

at particular times." ³⁷

This matter is discussed at greater length later in the chapter.

The Tasmanian model also uses the same two sets of pupil-teacher ratios, the assumed extent of improvement being basically comparable with the AEC national projections. The Tertiary Education Commission however, allows for only one set of pupil-teacher ratios, based upon what it sees as reasonable reductions "having in mind the relativities with overseas countries and the substantial costs that are involved in improving pupil-teacher ratios"³⁸. The 1985 national secondary pupil-teacher ratio, assumed by the Commission, is only a slight improvement upon the constant staffing standards projected by the AEC Working Party.

(iii) teacher demand projections

In calculating secondary teacher demand estimates, the AEC Working Party defined teachers thus:

"all persons holding teaching qualifications who are paid as teachers and regarded as such by systems, including principals, deputies and occupants of other promotions positions; it includes professional support staff, not necessarily based in schools, such as teacher librarians, remedial/resource teachers, advisory teachers, relieving teachers (permanent only), guidance and counselling staff, and those persons seconded to research, curriculum, and planning duties. Teachers on paid leave are included in the estimates, but those on long term unpaid leave and casual relief teachers are not included"³⁹.

In demand calculations only, teacher numbers were expressed in full-time equivalent terms.

It was recognized that numerous difficulties arose when this definition was applied to all school systems. Because the systems frequently used different methods of treating advisory or specialist

teachers not attached to specific schools; different methods of recording teachers on leave and consequently used different replacement procedures; then full comparability of information became difficult.

The issue is most pertinent to the national analysis provided in the report, where the demand and supply parameters were based on an aggregate of features arising from individual systems. To a lesser extent, it also influences overall State estimates, based upon an aggregate of the constituent systems within that State.

(C) Teacher supply.

The Working Party based teacher supply estimates upon the following three factors:

- (i) teachers continuing from the previous year;
- (ii) new graduates appointed from training institutions;
- (iii) teachers from other sources.

Supply estimates were made independently of the demand at any particular time, and relate to all teachers expected to be available for employment in a given year - except for the exclusion of teachers restricted in regard to location of employment.

As mentioned, it is at this point that the AEC approach differs significantly from the other two models. In the latter, demand estimates act as a ceiling to planned levels of supply. In all three instances however, supply is analysed in terms of the above three factors - with new graduates acting as the balancing factor in the supply-demand equation, in the latter two cases.

(i) continuing teachers

The numbers of teachers continuing in employment, and of those continuing to seek employment as teachers, were determined by prevailing wastage rates. Because insufficient information was available from the independent schools, State wastage levels were assumed applicable.

There is substantial doubt about projected wastage, as is conceded in the report. Apart from the general uncertainty about the future economic and employment context, with consequent influences upon resignations, wastage is also very much affected by such teacher characteristics as sex, age and qualifications. Teaching forces currently ageing at more rapid rates than were previously the case, must ultimately see increased retirement rates; secondly, resignations would be expected to be higher amongst female teachers of child-bearing age and amongst those teachers, usually female, where career is subservient to that of the spouse.

"For reasons such as these, the possibility of wastage occurring at levels above or below the rates on which the projections are based must be considered when reviewing policy options." ⁴⁰

The Working Party projected a wastage rate of around 9.5% at a national level, 1978-1985. Actual 1978 data suggests wastage is more likely to be somewhere near 7% for both primary and secondary teaching forces⁴¹, at least for the early years of the projection. The Tertiary Education Commission has reduced projected wastage to 5.5% for each of the primary and secondary teaching forces by 1983, thereafter to climb to 6.9% by 1990.

Difficulties in projecting wastage rates are discussed later in the chapter.

(ii) new teachers

Numbers of teacher graduates from universities and colleges, projected by the AEC Working Party, were based upon statistics provided by the tertiary institutions, by State Education authorities and/or by the Tertiary Education Commission. Although estimates generally assumed a continuation of intakes at about the 1977 level, in some instances, account was taken of the plans of individual institutions and of State Boards of Advanced Education, for reduction in intakes.

An initial question in this area concerns training courses, developed and developing, which provide the option of preparing for some occupation other than teaching, until the final stages of the course. This factor - together with possible student response to their assessment of the various job markets; and also with recent reduced financial assistance offered by many of the education systems to trainee teachers - could significantly influence the trends which have provided the basis of the Working Party's estimates.

This matter is also further discussed in a following section of the chapter.

(iii) other teachers

'Other teachers' are those re-entering, or seeking to re-enter, the profession, and those recruited or available for recruitment, from all other sources - except where appointed as the result of planned overseas recruitment campaigns.

The AEC estimate of potential numbers from 'other sources' has largely assumed a continuation of 1973-1975 rates of re-entry, allowing for some fall-off as the result of declining resignation rates. It has been further assumed that the fall in potential re-entry will lag the fall in wastage by four years.

Intending re-entrants, who comprise the bulk of recruits in this category, have been absent from active service on average for four years or more, and have acquired their teacher qualifications usually a substantial time before this. It is feasible that many will have minimal qualifications relative to the four-year trained recent graduate - even to the extent of having completed training under schemes of only one or two years' duration. Many of the employing systems might well regard these intending recruits as below current entry standards - and might therefore wish to exclude them partly or wholly from supply estimates.

There are several factors which could heavily influence availability of recruits from other sources. On one hand, the active recruiting efforts of many systems in the early 1970's perhaps elicited a larger number of such recruits than might be possible in future years - and it is on these earlier trends that projected estimates have been based. On the other hand, the relatively high resignations in the early 1970's, the continuing fall in the birth rate and increased participation of married women in the workforce, suggest the potential for increased recruitment from this source.

The uncertainties associated with this supply source, are evidenced by a comparison of the different assumptions made by the Working Party and by the Tasmanian Department of Education. In the former case, it has been projected that the annual number of available recruits from 'other sources' 1978-1985, will be equivalent to approximately 7.5-8.0% of each year's employed teacher establishment. Tasmanian planning, however, estimates 'other' recruits to be equivalent to only 4% of each year's teaching force⁴².

The accurate projection of this supply source is critical for the validity of the surplus, forecast by the Working Party. From the AEC data-bases, it may be calculated that 'other' recruits in 1985 will account for 20-25% of teacher surplus - with the balance being unemployed teachers from previous years. These statistics however,

understate the full contribution of this supply source to the projected surplus. The supply of new graduates 1978-1985, is consistently below each year's wastage level. Given the policy of most educational systems to give first priority to new graduates in offering employment, almost all excess teachers by 1985 will be from 'other' sources.

The Working Party considers that of the three supply sources, this particular element is to be regarded with the most caution. The warning is well-founded. If its estimates about 'other recruits' were halved - still being at the Tasmanian level - the 1985 surplus would also be halved, (assuming constant staffing standards). Assuming improved staffing standards, by 1985 the teacher surplus would be totally removed (allowing for the unsuitability of a small proportion of applicants). Possibly the extent of error will not prove as great as 50%: even so, much of the Working Party's calculations in this area appear indeed, dubious.

(iv) teacher supply projections

The AEC Working Party supply estimates assume that all new entrants and prospective teachers from other sources, will be available for full-time employment.

"To the extent that some may offer for part-time work only there could be some over-estimation through time of the number of teachers available (supply) compared to demand which has been calculated in terms of the number of full-time teachers required on a per-pupil basis."⁴³

A similar stance was taken by the other two planning models.

The failure to consider in detail the issue of part-time employment, may prove to be a serious shortcoming. The South Australian and Tasmanian State Education Departments have accepted in practice the concept of permanent part-time teaching positions,

including tandem employment. Several other systems are currently negotiating the matter with teacher federations and unions. Due to the assorted uncertainties associated with teacher forecasting, the Federation of Australian University Staff Associations strongly recommends permanent part-time employment as the most appropriate response to anticipated teacher surplus⁴⁴.

In view of the high proportion of females in the teaching profession, and in consideration also of the alleged tendency for females to have deferred resignation because of the difficulties of re-entry, it is feasible that increased incidence of part-time employment could come to absorb most, if not all, of the eventual surplus.

(D) Comparison of supply with demand.

When the AEC supply and demand estimates were compared over the period 1978-1985, it was found that at most State and at national levels, for the primary and secondary sectors, and in relation to both constant pupil-teacher ratio and improved pupil-teacher ratio assumptions, supply was expected to be substantially greater than demand. The Working Party has measured the imbalance in terms of the cumulative excess of teachers: i.e. for a given year, the number of surplus teachers derived from the various supply sources, together with that number of excess teachers resulting from previous years.

It was recognized that in practice some prospective teachers would not continue waiting for a teaching position but would either seek alternative employment, or for other reasons cease to seek teaching positions. This loss rate was assumed equivalent to the wastage rate of the employed teaching force.

Some extent of teacher over-supply is required by virtually all educational systems - in the short term: to allow for a limited pool

of part-time and casual, relief teachers; and perhaps more importantly, to allow systems some choice with regard to the professional suitability of available applicants. The recent National Inquiry into Teacher Education⁴⁵ (the Auchmuty Inquiry) has argued the need for a deliberate over-supply of teachers, to the order of 10% of the annual output of pre-service courses.

The Working Party has made no attempt to assess the required extent of over-supply.

The Tertiary Education Commission has made partial allowance for the above factors by assuming that 5% of each year's supply of new graduates would be either unavailable or unsuitable to the teaching profession. The Tasmanian model plans for an annual excess of 25 primary and secondary teachers for each of the three administrative regions in the State - equivalent to just over 15% of current annual graduate output.

(E) Preliminary appraisal.

The usefulness of the forecasts derived from the three models, may be restricted by two general factors. The first factor consists of the range of untested assumptions and uncertainties underlying supply and demand estimates. Most of the assumptions as they pertain to the components, particularly of the A.E.C model, have been outlined above.

Potential sources of error in this regard, include:

- (i) the occasional practice of applying statistics derived from State school systems to independent systems. Thus the use of State teacher wastage rates, for example, fails to take into consideration the existence of teaching orders, the members of which form a large component of the staff of many independent schools - and for whom, wastage rates would be expected to differ quite sharply;

(ii) the inability even of some State systems, to provide the full range of required information. For example, the AEC Working Party has excluded from consideration, those numbers of teachers who exercise "unduly restrictive geographical preferences"⁴⁶. It may be confidently argued that for most systems, any data provided about this aspect would be extremely tentative.

Apart from the assumptions about recruits from 'other sources', one of the more serious instances of data inadequacy concerns the calculation of the cumulative excess of teachers - where, it may be recalled, any drop-off in the number of unemployed teachers seeking teaching positions from one year to the next, was directly equated to the wastage rate of employed teachers. It is very difficult to see how the loss rate of unemployed teachers to other occupations bears any logical relationship with the resignation, retirement, and mortality rates of employed teachers⁴⁷.

The Williams Report viewed the projected loss rate of unemployed teachers from a different angle, throwing further doubt upon the Working Party's assumptions and conclusions in this area.

"If unemployment were reduced to again 3% then it would be realistic to remove at least 25% of the excess supply from the previous year. The effect of removing this 25% would be to reduce the Working Party's basic estimates of the excess supply of primary teachers by 50%. In the case of secondary education a similar procedure would remove 60% of the projected excess supply" ⁴⁸

Put another way, the magnitude of surplus predicted by the Working Party depends directly upon a continuation of the current employment climate.

Equivalent examples of data inadequacy may be readily found for the other two models.

The second general factor concerns the limited scope of the

supply and demand estimates. Many of the limitations may be directly attributable to the forecasting models' exclusive reliance upon the pupil-teacher ratio as an index of educational conditions - discussion of which has been deferred until a later section of the chapter. At this point, attention will be paid to the several categories of teachers which have been excluded from detailed consideration by the Working Party.

The first category consists of casual relief teachers, (although some other categories of part-time teaching staff have been included). Their exclusion could mean that in a given year, even if some excess of teachers had been predicted, an employing authority could still have difficulty in meeting all staffing vacancies. Should there occur an increased demand for relief staff - e.g. as the result of increased long service leave entitlements - then this category may come to absorb, either directly or otherwise, a sizeable portion of any projected surplus. The various estimates do not allow for any detailed planning in this respect.

Professional support staff - guidance, curriculum and research officers, etc. - constitute a further category omitted from all three approaches. The extent to which these employees may be regarded as teachers, so far as the nature of their duties is concerned, is open to some question.

However it does seem that many service branches require experienced teachers or applicants with teaching qualifications, to fill their positions. A customary method of entering the service branches is for a school-appointed teacher to be seconded for a one- or two-year period, during which time permanent appointment often results. In such instances, the teacher concerned is rarely shown as a wastage statistic in regard to the teaching force. Another method of entry is for a new teacher graduate with specific skills - e.g. counselling, librarianship - to be appointed directly to a service position. In this case, it is easy for the appointee to be

shown as an 'excess teacher' statistic, in that he/she had graduated from a teacher training course, but was not employed as a teacher.

Given the largely uncharted extent of teacher movement into the service branches, and given that the number of service branch positions may be of the order of 10% of the combined primary/secondary teaching forces⁴⁹, this area well warrants inclusion in teacher supply and demand forecasts.

The three models have recognized teachers as specialists, to the point of distinguishing between primary, secondary, pre-school, and technical and further education staff - with the latter two categories having been excluded from consideration. The various specialities of primary and secondary teachers were not considered in any further detail. It has been already argued at some length, that the failure to include a detailed consideration of teachers as subject specialists, has limited the value of the forecasts as planning aids.

One further specific factor needs be mentioned at this point, which if granted, restricts the range of responses which might be made to the various teacher estimates pitched at a national level.

"Each state has a discrete teacher market ... which resembles an internal labour market in structure and operation. ... Teachers, throughout Australia, are not a homogeneous labour resource."⁵⁰

Numerous differences between State education systems, together with a reported limited interstate mobility of teachers, ensure that supply and demand planning policies must ultimately be made at the level of each State system, rather than at a national level⁵¹.

4 TEACHER FORECASTING: SOME EXAMPLES OF PERFORMANCE

Despite one major conceptual difference, there is sufficient similarity between the AEC, Tertiary Education Commission and Tasmanian models for them to be regarded as of the same general type. In all three instances, demand estimates are determined by pupil enrolment projections and expected pupil-teacher ratios; in all instances, supply is calculated in terms of the same three sources. In both supply and demand contexts, many of the underlying statistical assumptions are common to the three models.

Appraisal of this general approach may be made from several possible angles. Any meaningful appraisal however, must include the capacity to predict with accuracy, as a basic index of the model's value. Given the relatively short history of Australian national teacher forecasting, it becomes necessary to look at overseas forecasting attempts, to assess this capacity within a reasonably full context.

(A) Teacher forecasting in England⁵².

The National Advisory Council on the Training and Supply of Teachers released its first forecasts in 1956. Over the next ten years, the Council presented two further sets of teacher supply and demand projections, aimed at ensuring the adequate staffing of schools in England and Wales. The forecasting model used by the Council on each occasion - and used also by its successor, the Department of Education and Science - is a direct antecedent of the type discussed in this report.

Like Australia, Britain experienced a post-war baby boom - one in which the birth rate reached an early peak in 1947. By the mid-1950's, teacher demand was exceeding supply due to the 'bulge'

cohorts passing through the school systems. The prevailing fall in the national birth level however, made it seem likely that teacher shortage would soon become a problem of the past. Estimating that the combined primary/secondary enrolment would peak in 1961 and decline at least until 1967, the Council accordingly recommended in its first report that the number of pre-service training positions be more or less frozen, and that duration of training be expanded from two to three years - this latter aspect serving partly as a means of avoiding an impending teacher surplus.

It has since become a matter of fact that in the 1960's, there occurred a severe shortage of teachers. A number of emergency measures were necessary in an attempt to remedy the situation - including a dramatic expansion of teacher college enrolments from 43,350 in 1960 to 130,679 in 1970.

In presenting its second set of estimates in 1962, the Council was forced to describe the prevailing and anticipated teacher shortage as "a chronic disability"⁵³. In addition to a recovery in the birth rate which almost immediately followed publication of the 1956 projections, there also occurred widespread public demand for improved educational conditions, adding to the increased level of teacher demand. On the supply side, the wastage rate of young female teachers had risen sharply - a trend associated with the birth rate recovery. The Council accordingly recommended that teacher supply be increased.

In its final, 1965 forecasts, the Council, predicting a continuation of teacher shortage, recommended a quickened expansion of the teacher college sector. This expansion came about - despite a fall in the birth rate that was evident even at the time of publication, and despite a consequent stabilization of wastage rates.

By 1972, the British Government was forced to reverse its policy of teacher college expansion, by announcing an intended reduction of up to 40% of pre-service enrolments over the next ten years. Despite

a reduction on this scale, supply sources were still considered adequate to enable an 'across-the-board' 10% improvement in staffing standards. Since 1972, a continued birth rate decline set against a background of fairly bleak economic circumstances, has prompted a series of further revisions of teacher supply and demand estimates.

"To sum up, British planning for teacher supply in the past twenty years has veered alarmingly between two extremes. In 1956, and again in 1972, the supply situation seemed so hopeful that the Government was cheerfully contemplating substantial reduction in teacher training enrolment and output. In the interim, from about 1958 to 1968 - with the 1962 and 1965 Reports of the National Advisory Council as high points - the whole emphasis was on the most rapid expansion of teacher training colleges possible." ⁵⁴

Harsher summaries of the Council's forecasting efforts may be found: "planning of teacher supply since the war has been a farce; (it) has without exception always been wrong ... " ⁵⁵.

(B) Teacher forecasting in Australia.

(i) the Martin Committee forecasts, 1964

In its 1964 report, the Committee on the Future of Tertiary Education in Australia (the Martin Committee), presented a set of government school teacher supply and demand forecasts for the period 1964-1975 ⁵⁶. Both the projected enrolments and the underlying assumptions about future movement in the pupil-teacher ratio, were based upon a policy statement issued by the AEC the preceding year ⁵⁷.

The government teaching force for 1975 was consequently forecast to be 116,400 teachers - 68,300 in the primary sector, 48,100 in the secondary. Assuming the forecast to be in full-time equivalent terms,

the Committee's estimate for 1975 was within 6% of the actual situation⁵⁸. Primary demand projections over-estimated by 6%; secondary projections under-estimated by 18%.

For the primary sector, the projected enrolment level over-estimated the actual situation in 1975 by 12%. On the other hand, the pupil-teacher ratio fell at a faster rate than was anticipated - the projected pupil-teacher ratio of 24.0 being 6% higher than was actually the case. (Had only the 1975 full-time primary teachers been considered, teacher demand would have been over-estimated by 9% - with the discrepancy between actual and anticipated pupil-teacher ratios being 3%.)

In the secondary sector, two-thirds of the demand under-estimation may be traced to the enrolment projections, which fell short of the 1975 enrolment of 834,301 pupils, by 13%. The actual pupil-teacher ratio improvement was also under-estimated by 6%. (Had only 1975 full-time teachers been considered, the extent of error would have been 13% - totally attributable to the enrolment projections.)

By assuming a wastage rate of 7% per annum for both the primary and secondary teacher forces, the Martin Committee estimated that by 1975, there would be the need to appoint 14,300 recruits to State school systems to meet the increased levels of demand. Approximately 90%, or 13,000 of these recruits would be directly from training institutions.

The Committee's wastage projections - and thus recruitment estimates - have proven to be very much in error. Over the period 1972-1974 for example, average annual wastage for primary teachers was 12%, and for secondary teachers, 14.5%⁵⁹. In 1975, approximately 21,600 teachers were recruited to State primary and secondary schools throughout Australia⁶⁰ - the Martin Committee estimates thus understating supply levels by around 33%, an error commensurate with

the teacher surplus forecast by AEC Working Party.

(ii) Wood's forecasts, 1969

Another early national study was undertaken by Wood in 1969⁶¹, again based upon an approach comparable with that of the AEC. Using 1966 statistics as an actual data-base, Wood forecast that by 1975, the combined primary-secondary Australian teaching force would need to expand to 152,250 full-time equivalent teachers - compared with some 98,000 in 1966. Actual data⁶² show that the 1975 teaching force numbered 152,431, seemingly providing a spectacular vindication of Wood's assumptions.

This apparent vindication however, is unable to withstand any detailed analysis:

first, the projected 1975 primary-secondary enrolment was 3.25 million pupils. The actual enrolment was 2.9 million, representing a forecasting error of 11% of the actual level. The bulk of this error occurred in the primary sector (a 16% shortfall); over the nine years, Wood's secondary enrolment predictions overstated actual enrolments by only 4%;

secondly, the projected pupil-teacher ratios were 26.1 for the primary sector and 16.1 for the secondary sector. Actual pupil-teacher ratios were 23.2 and 14.9 - representing errors of 12.5% and 8.1%, respectively.

The extreme accuracy of Wood's teacher demand estimates thus came about as the result of incorrect projections each cancelling the effects of the other.

It is of interest to rework Wood's forecasts in the light of actual 1975 statistics. Had his pupil-teacher ratio expectations held firm, the actual 1975 primary-secondary enrolment would have required 137,000 teachers; had enrolment predictions been accurate, the 1975 pupil-teacher ratios would have entailed a combined teaching force of 170,000. This consequent theoretical error range of some 33,000

teachers is equivalent to 22% of Wood's predicted 1975 teaching force - a measurement of error which falls near the lower extreme of teacher excess, estimated for 1985 by the AEC Working Party.

The above exercise carried out for the secondary sector only, returns a theoretical error range that has been almost halved - equivalent to 11.6% of Wood's initial 1975 secondary teacher estimate. The relatively higher validity of Wood's secondary forecasts is in accordance with expectations, given the reduced influence of any projection error with regard to future birth rates. (This aspect however, was not true of the Martin Committee forecasts.)

Wood projected that by 1975, teacher wastage would have fallen to 9% per annum - meaning for that year, a projected loss of about 14,000 teachers. Total recruitment for 1975 was estimated to be of the order of 20,000 teachers, if the extra demand occasioned by an enlarged enrolment and by a lowered pupil-teacher ratio was to be met.

Although his wastage projections proved more accurate than those of the Martin Committee, Wood still under-estimated the extent of actual 1975 wastage. The consequence was that for that year, an extra 5,000 teachers were recruited to compensate for the wastage factor, in addition to those allowed for by Wood. Total recruitment for 1975 was almost 29,000 teachers⁶³.

(iii) the 1978 AEC Working Party forecasts⁶⁴

The issue of data incompatibility, mentioned as a footnote with regard to the previous two forecasting exercises, is especially relevant to an assessment of the Working Party's forecasts. Even very small differences between the AEC data-bases and those developed by the Australian Bureau of Statistics, become significant within the limited time span over which the forecasts may be presently tested. Particularly, differences in the classification of pre-school/early primary teachers and pupils, and in the definitions of teachers used

by the two bodies, made it impossible to assess in detail, the Working Party's demand estimates, particularly for the primary sector.

Making a very broad allowance for the discrepancy between the two sets of secondary data in 1977, it appears that actual teacher developments over the first two years of the projection period, have in the main kept pace with the Working Party's estimates, based upon improved staffing standards. For as long as this continues to be the case, teacher surplus is unlikely to rise above 15%, assuming basic validity of the Working Party's supply projections.

In addition to the probable over-estimation of likely recruitment levels from 'other sources' previously discussed, the other major supply error made by the Working Party which can be discerned at this stage, concerns wastage projections. The 1978 national wastage rate of around 7% for both the primary and secondary sectors⁶⁵, falls significantly short of the projected 9.5%.

The consequences of an error of this magnitude, can be readily illustrated. Holding all other supply and demand components steady, the projection of the actual 1978 wastage rate until 1985 would mean a cumulative surplus of teachers some 55% above total requirements, assuming a constant pupil-teacher ratio. If improved staffing standards were assumed, the excess would be around 40%.

The Working Party's demand estimates appear to be holding up reasonably well. Probably the best that can be said for supply estimates, is that they could well prove broadly correct - but for the 'wrong' reasons.

The above examples have been included in the report, to illustrate the range of errors which may beset teacher forecasting. Although such errors are not necessarily all associated with a particular forecasting effort, it is contended that the possibility of

their presence must always be considered in any planning response to a given set of projections.

5 APPRAISAL OF AUSTRALIAN TEACHER FORECASTING

(A) Non-quantitative considerations.

One of the harshest critics of quantitative teacher planning is McGrath, who argues that:

"to start from 'estimates of the supply of, and demand for, primary and secondary teachers in Government and non-Government schools from 1978 to 1985' is at best unhelpful and at worst positively misleading"⁶⁶.

A claimed weakness of such planning lies in the restricted definition of the problem under analysis - centring as it does, upon the expected surplus numbers of teachers to emerge from training institutions and other sources.

"It makes no sense to talk of a teacher surplus when most communities are without pre-schools; when physically and mentally handicapped children are in large part neglected; when an uncomfortably large percentage of the adult population are reported as being functionally illiterate.... and so on. From this viewpoint, then, the problem is not an imminent teacher surplus, but rather a continuing educational deficit, which for the first time since World War II, educational systems have the opportunity to correct."⁶⁷

If indeed there is to be an excess of qualified teachers, what is customarily viewed as an employment/unemployment problem would be more meaningfully construed as a problem in educational resource planning.

McGrath contends that only from this wider basis, can adequate attention be paid to the full range of factors affecting the utilization of human resources in educational systems. For example:

"there is ... an implicit if not explicit acceptance, in current government reports on the teacher supply question,

of the current rigidities which prevail in Australian educational systems - between different sectors (technical v. professional), different levels (school v. pre- or post-school), and different kinds of teaching (specialist v. general)"⁶⁸.

Because of these and other rigidities, the only apparent solution to an impending teacher surplus, lies in the adjustment of recruitment levels in both pre-service and re-entry contexts.

A resource policy approach to planning, however, would include at least the issue of training. Rather than seeing a training course as being only able to produce teachers, and for the most part, mutually-exclusive categories of teachers:

"it is clear that versatility in training, involving an extended core program with some final specialization, the unification of teacher categories, the employment of teachers in different sectors of the system, and the employment of adults with other than educational professional experience in the educational system, together with opportunities being made available for these currently employed (or unemployed) teachers to transfer temporarily or permanently out of the teaching force, are all matters of resource policy which infringe very closely on the question of teacher supply"⁶⁹.

Many educationalists would agree with McGrath that teacher planning based solely upon the quantitative aspects, must ultimately prove inadequate - although few would be prepared to dismiss totally the value of supply and demand forecasting, as this writer has done.

Educationalists have for example, long argued that teacher planning must take systematic heed of the quality of expected applicants - an aspect generally ignored by forecasting approaches.⁷⁰ For example, participants at a National Seminar on Educational Planning conducted in Canberra in late 1968⁷¹, paid

extensive attention to the matter of quality and professional suitability of teacher recruits. It is this issue that has prompted R. Selby Smith to describe the predicted teacher surplus as a 'golden opportunity': "can we not (now) markedly improve the quality of the teaching force by the intelligent selection ... of suitable candidates from the abundance of young people available?"⁷².

That there is scope to improve selection techniques, is supported by recent studies by Anderson.

"Teaching has, for many years, attracted more than its fair proportion of students with marginal motivation. In my own studies of four professional groups ... the number with low or ambivalent commitment to their profession was greatest amongst the students in teaching."⁷³

C. Selby Smith reaches a similar conclusion, suggesting that in the past, many teachers were attracted to the profession solely through the lucrative aspects of studentship training schemes⁷⁴.

There are many other non-quantitative factors which need to be taken into account in teacher planning. As one further specific example, the 1968 National Seminar pointed to the importance of staffing patterns, claiming that to be fully effective, teacher planning needed to consider amongst other aspects, the efficacy of various combinations of teaching personnel, ancillary staff, consultants, teaching aids, etc.⁷⁵.

(B) The pupil-teacher ratio as a forecasting device.

Almost all quantitative approaches to teacher demand forecasting rely upon the pupil-teacher ratio as the major forecasting device. Its critics however, are numerous - and commonly point to several conceptual and practical shortcomings.

The National Advisory Council in England developed the

pupil-teacher ratio to allow the elimination of over-sized classes in primary and secondary school systems⁷⁶. Two assumptions were made: first, that there would be a direct relationship between average size of class and the pupil-teacher ratio; secondly, that the average size of class - and thus, pupil-teacher ratio - would fall at the same rate as the proportion of over-sized classes.

In relating staffing standards to class sizes, the Council used several slightly different formulae across school sectors. In regard to the junior secondary situation, the following was used:

$$P/T = (P+/N) \times (T+/T \times P/P+ \times n/T+)$$

where: P = total number of pupils;
 T = total number of teachers;
 P+ = number of pupils in class at a given time;
 T+ = number of teachers in class at a given time;
 n = number of classes.

This equation states that the pupil-teacher ratio depends upon average size of class, the number of teachers engaged in teaching at the one time, the number of pupils being taught at that time, and the average number of teachers per class.

In some of the earlier Australian teacher planning efforts, this concept of the pupil-teacher ratio was accepted unchanged - although slightly different versions of the above formula were developed. For example, in 1968 a committee was established in N.S.W. to investigate and advise on class sizes and teaching loads in government secondary schools⁷⁷. In the course of its work, the committee made use of a formula which served to calculate class size from a number of data. In a simplified form, the following was used:

$$\text{class size} = (E \times K)/(T \times M)$$

where: E = number of pupils;
 K = number of time units of instruction received
 by each pupil;
 T = number of teachers;
 M = average number of time units of instruction
 given by each teacher.

As E/T corresponds to the pupil-teacher ratio (ptr), and as in a junior high school, each pupil customarily receives instruction in all teaching periods, the formula, at least for this school sector, may be restated thus:

$$\text{ptr} = A \times M$$

where: A = average class size;
 M = the average teacher loading (such that the
 maximum possible value of M is 1.0).

(The validity of the latter formula has been examined in the Tasmanian secondary school sector, as later discussed.)

As noted by Ahamud however:

"it is easy to see that a decrease in the pupil-teacher ratio will not necessarily lead to a reduction in the average class size or in the proportion of over-sized classes. If the pupil-teacher ratio falls, extra teachers who become available may be used to increase the number of remedial classes, or to broaden the range of subjects taught, or in pursuing educational objectives other than the elimination of over-sized classes"^{78,79}.

On the other hand, it may be possible to eliminate over-sized classes by a simple redistribution of the stock of available teachers, without necessarily entailing an expansion of the teaching force.

The 1968 National Seminar on Educational Planning reached a

comparable conclusion. An example presented to the Seminar was that in one Australian State where the primary pupil-teacher ratio stood at 25:1, 11% of classes contained 41 or more pupils - this, despite previous research evidence indicating that a ratio of 26:1 would ensure a maximum class size of 40⁸⁰.

Participants in the Seminar went further in their criticism of the pupil-teacher ratio as a planning device. Even if it were granted that a target pupil-teacher ratio could be related more or less precisely to an average class size:

"the significance of class-size as a criterion lies in its implication for educational practice. It is assumed that the figure chosen is the limit up to which teaching is effective (or at the very least, any reduction will mean more effective teaching). A judgement such as this is ... based upon assumptions about methods used, curricula followed, examination requirements, and aids available. The impact of any changes in these assumptions ... could be considerable"⁸¹.

It was concluded at the Seminar that the pupil-teacher ratio "is to a large extent an ad hoc index, the expression of present circumstances rather than the predictor of new ones"⁸².

As well as conceptual limitations, there are also practical difficulties in anticipating pupil-teacher ratio movements - a point to be discussed more fully in the following section.

(C) Three major aspects of quantitative forecasting.

Appraisals of teacher forecasts based upon models of the general type previously described, frequently concentrate upon three specific components - the pupil-teacher ratio (in a demand context); and teacher wastage and estimated output of training institutions (each in

a supply context). Despite bearing the brunt of the forecasting burden⁸³, the projection of these components as discussed below, has limited reliability.

(i) the pupil-teacher ratio

If the national secondary pupil-teacher ratio projected by either the AEC Working Party or the Tertiary Education Commission, proves to be in error in a given year by only 0.1, the consequent demand estimates could be out by more than 800 teachers.

Despite such sensitivity, the difficulties involved in forecasting pupil-teacher ratio movements are far from being resolved. Because any improvement in staffing standards is dependent upon the provision of government financing, and because this provision appears so frequently to be organized on a year-to-year basis, target pupil-teacher ratios can be easily deferred or surpassed. As noted by Burke, the establishment of the Schools Commission and the extent of Federal involvement in educational funding from 1974 onwards has further clouded this area. Burke's conclusion: "it would ... seem quite heroic to believe that either governments or onlookers could forecast the trend in funding with any confidence"⁸⁴.

A consideration of the teacher employment situation in the Queensland State Department of Education, indicates the uncertainties associated with forecasting staffing standards.

The Department's planning calculations have been very much influenced by the 1971 Murphy Report⁸⁵, which presented a series of recommendations relating to various improvements in classroom and teaching conditions. Because the bulk of these recommendations were accepted in principle by the State Government, the planning model used by the Department from 1975 onwards, has allowed for improved pupil-teacher ratios and for enlarged teaching forces at both the primary and secondary levels, in order that the Murphy recommendations

might be achieved over a specified period of time.

In 1977 the State Treasurer determined that the combined primary-secondary establishment would not exceed 20,000 teachers - a level only slightly above the teaching force of that year. Despite recent slight relaxation of this restriction, it remains that the present secondary teaching force is more than 1,000 teachers below the anticipated level, with a comparable situation existing in the primary sector. Given a generally rising pupil enrolment, the Treasurer's decision has effectively reversed, albeit slightly, the expected movement in pupil-teacher ratios.

The integrated planning system coordinated by the Queensland Board of Advanced Education, itself a product of the Murphy Report, has meant that since 1975, training institutions have operated on a quota system to regulate teacher supply. The prevailing surplus of teachers in Queensland may be largely, if not totally, attributable to the above funding decision. (The Personnel Officer of the Department at a recent conference on teacher education, reported that despite the various uncertainties associated with teacher forecasting, political decisions represented the only major element which his Department's planning officers could not "within reason" anticipate.⁸⁶)

As an indication of the extent of surplus in Queensland, it has been estimated that at the beginning of 1980, 1,100 new graduates were without teaching positions, and were to join 1,000 unemployed teachers from the previous year⁸⁷.

(ii) teacher wastage projections

In its criticism of the Tertiary Education Commission's 1979 estimates, the Federation of Australian University Staff Associations strongly attacked the wastage projections used.

"Our concern in this area is with what degree of confidence the TEC predicts that the teacher wastage rate in the 1980's

will remain at 5.5% ... The TEC can verify that even an error ... (of) only two percentage points in say, 1983, would create additional demand for about 3,700 teachers in 1984 - an increase of 29% over TEC predictions."⁸⁸

It is difficult to exaggerate the possible consequences of errors in wastage projections. Ahamud claims that this factor represents the most influential single source of forecasting error - and points to the under-estimation of teacher wastage made by the National Advisory Council in England, in its 1956 report. As a consequence of the error, "the enormous expansion of the colleges of education ... made no contribution at all towards reducing the teacher shortage"⁸⁹.

In an Australian context, Burke views wastage projections as "one of the most unpredictable elements in the whole demand and supply analysis"⁹⁰. This unpredictability was attributed to three basic factors which operate upon teacher resignations - select teacher characteristics, such as age, sex and qualifications; the general state of the employment market; and the inter-relationship of supply and demand, whereby anticipated re-entry difficulties, for example, serve to deter resignations.

Burkhardt in an analysis of teacher wastage, isolates two broad sets of factors as prime determinants of teacher resignations⁹¹. First, there are economic and demographic factors - which include teachers' salaries, labour market fluctuations, marketability of teachers' qualifications and male-female recruitment ratios. There are also administrative factors - job satisfaction, employment conditions such as class loads and promotional opportunities, conditions surrounding recruitment, and so on.

Burkhardt⁹² and C. Selby Smith⁹³ point especially to the condition of the labour market as a major contributant to teacher loss. Deriving their data from a period when annual wastage was 16% and higher, both researchers concluded that as teachers became

financially disadvantaged, relative to graduates in other occupations - as a result of low salary ceilings, reduced promotional prospects, lower rates of salary increases, etc. - resignations tended to increase. This tendency was also affected by the availability of alternative careers: hence Selby Smith found that Science teachers were more likely to resign than, for example, Humanities teachers.

The change in wastage trends during the 1970's, against a background of rising general unemployment, has left most educational planners with, at best, outdated data-bases. Forecasting approaches therefore, tend to rely upon a wastage estimate projected unchanged over future years⁹⁴, and hence are unable to anticipate future economic and other changes. Where differential wastage projections are made, they appear as fairly crude in derivation.

The Tasmanian situation exemplifies the consequences of erroneous wastage projections. Total teacher resignations reached a peak in that State in 1968, at 16.9% of the permanent teaching force; by 1976, resignations had fallen to 9.4%; and by 1979, to an estimated 5.0%.⁹⁵

This fall was the main cause for the State Premier having to announce towards the end of 1980, that for the first time, the Department would be unable to offer employment to approximately half the 1980 graduates from its studentship scheme. The Minister's announcement has since been rescinded - with the Department having to rely upon several strategies to absorb studentship scheme output, including permanent part-time employment and further encouragement of early retirement.

To varying extents, errors in forecasting wastage levels prove self-correcting. If projections over-state actual resignations, there will inevitably be an increase in wastage through retirements. On the other hand, if an unexpected recovery in teacher resignations occurs, there will also be increased re-entry rates. Such compensations

however, are of strictly limited use to educational planners, because of the considerable time lag between initial error and eventual partial correction.

(iii) new teachers

The three models that have formed a focus of discussion in this chapter, understandably require that an estimation be made of the future output of teacher training institutions. The AEC model's projections rely upon pre-service enrolment trends evident by 1977; in the other two instances, the projection of new teachers has been manipulated in the light of anticipated supply and demand balance.

A major cause of uncertainty is the extent to which anticipated teacher surplus (or in different circumstances, teacher shortage), will interact with actual pre-service enrolment levels.

The expected magnitude of teacher surplus in Australia has prompted a number of calls to restrict entry to pre-service training through a quota system, be that system formal or otherwise. Anderson for example, has argued that "while some surplus of output is manageable, the position has become so out of balance that quotas should be introduced"⁹⁶. Anderson's views, reflected in a series of recommendations made in regard to the South Australian situation⁹⁷, are clearly in line with the approach taken by the Tertiary Education Commission.

Certainly quota systems if enforced, would set a ceiling upon future numbers of new teachers. However, even if it were granted that the accuracy of forecasting efforts justify such a system, and possible philosophical misgivings aside, the establishment of quotas would not totally resolve the uncertainties associated with this element.

Queensland appears to be the first State in Australia to have

made use of a quota system, largely acceptable to the individual training institutions. Despite the regulatory role of the Board of Advanced Education however, a teacher shortage in Queensland has been predicted⁹⁸ - perhaps as immediate as the next three to five years. This possibility may be, at least partially, the consequence of a common response to the prevailing surplus situation in the State, whereby the fear of unemployment upon graduation has effectively deterred many prospective teachers from entering training. As a result, enrolments in some training courses are as much as 33% below quota levels⁹⁹. It is in this context that Burkhardt refers to "a flight from the profession"¹⁰⁰.

This response is not unique to Queensland. Because of employment difficulties, real or imagined, together with the abolition of most States' studentship training schemes, "it would be no exaggeration to claim that there was a scramble for teacher education students among CAE's and universities at the beginning of this year"¹⁰¹, to acquire enrolment intakes satisfactory to the training institutions.

Burke points also to the prospect of market adjustments influencing the future output of training institutions.

"The experiences in England of a rapid decline in demand for places, outflanking their drastic reduction in places available, and changes in career plans as in the USA are quite likely to occur in Australia. Unless academic scavenging proliferates with continual reduction in entry standards to courses of training, it appears likely that entry to pre-service teacher education and survival through it will fall substantially."¹⁰²

The AEC Working Party has recognized that the operation of market forces might partly diminish any imbalance - but was unable to incorporate a quantified consideration of these forces in its estimates. The Tertiary Education Commission has seemingly ignored the possibility.

6 AN AUSTRALIAN OVERVIEW

The William's Committee has described teaching as an area where demand forecasting appears more predictable than in most other occupations, because of the small number of employers and the close relationship between population movements and school numbers.

"There are however many uncertainties about population movements and in the ratios of pupils to teachers. Expectations of a close result in an election could be the cause of a sudden change in prospective ratios. Changes in the ratios are also sensitive to economic growth and the buoyancy of public revenues. Retention rates in secondary schools are also influenced by the state of the economy."¹⁰³

Burke has assessed the accuracy of a number of State and national forecasting efforts. As a consequence of demand and supply uncertainties, he concludes:

"that even for teachers the margin of error in forecasts beyond about four years is very large. A small percentage error in total employment represents a large error in new jobs available"¹⁰⁴.

Allowing for prevailing wastage rates, a forecasting error of 2% in total teacher demand for example, could entail approximately a 15% error in the number of new jobs available.¹⁰⁵

Certainly the reviews undertaken in this chapter dispel any certainty of the 20-40% teacher surplus predicted by the AEC Working Party. The range of errors associated with both the Martin Committee forecasts and Wood's forecasts, if repeated, could well cancel out any anticipated surplus of this magnitude. The detailed analysis of the AEC forecasting methodology suggests that the recurrence of such an error-range is indeed, feasible.

Almost regardless of the cautionary terms in which they might be couched, teacher forecasts are invariably accepted as definite parameters. The AEC Working Party prefaced its 1978 report with a definite warning in this regard; so too, albeit to a much reduced extent, did the Tertiary Education Commission in its 1979 paper. Despite this, both documents have been used as 'hard data' to justify recommended reductions in teacher pre-service training intakes.

Such usage is certainly not warranted, given the past record of teacher forecasting efforts.

"On past experience one would have grave doubts about the use of forecasts in specifying quotas on courses of teacher education which last three or four years."¹⁰⁶

Rather, Burke sees the main use of teacher forecasts to be two-fold:

- (i) to indicate the general direction, rather than the size, of any change in the teacher supply and demand situation;
- (ii) to provide labour market information for students.

Even at these broad levels, uncertainties still persist - as evidenced by the present surplus situation in Queensland, threatening to turn very shortly into a teacher shortage.

The foregoing discussion has concentrated upon the major sources of error which may beset the type of forecasting model commonly used both in Australia and elsewhere. Although it has been concluded that the consequent predictions must be tempered with caution, it has not been intended to argue against the use of this forecasting model. To make further reference to the Williams Report:

"most decisions on education and training are made on the basis of forecasts - whether implicit or explicit, formal or informal. Often a more critical question than the accuracy of formal forecasts, is whether in the absence of formal forecasts the implicit or the informal forecasts that would be called into service would be as satisfactory. A formal forecast has the advantage that it provides a systematic framework for making assumptions explicit, and organising

information, and makes it possible to compare forecasts and events to detect the reasons for errors of forecast."¹⁰⁷

Support for the continued usage of formal forecasts, may also be found in the Auchmuty Report¹⁰⁸. Evidence given to the Inquiry revealed that all State departments of education undertake long-term forecasts of teacher supply and demand - and rely upon regular updating as a means to limit the various restraints which act upon accurate forecasting. As a specific example, the Victorian Education Department submitted an extensive list of forecasting difficulties - which list acts as a convenient summary of much of the preceding material contained in this chapter.

"Despite the great complexities involved in manpower planning, all employing authorities saw the necessity for forecasting at the national level and more importantly, as they saw it, at State level."¹⁰⁹

Both from the material available to the Auchmuty Inquiry and from the details provided by recent State inquiries, the forecasting models commonly used are of the same general type described in this chapter.

One further aspect warrants attention before closing this section of the report. The type of model which has formed the focus of much of the chapter appears as a fairly crude construction when placed in the full context of possible manpower forecasting methodologies¹¹⁰. Whilst these more sophisticated models are largely applicable to the teaching profession, it is considered that their usage by no means, guarantees more valid results. As long as the uncertainties about forecasting staffing standards, teacher wastage and other factors persist, such models will at best maintain error-ranges of the magnitude previously outlined.

After reviewing the attempts of the National Advisory Council on the Training and Supply of Teachers in England and Wales, and its successor, the Department of Education and Science, to incorporate

more detailed and precise components in their forecasting framework, Ahamud reaches a similar conclusion.

"(Detailed) models of the type used by the DES ... seem to introduce an unnecessary complexity in obtaining projections for fairly broad aggregates: this complexity tends, moreover, to create the mistaken impression of high statistical reliability. Aggregate models are simple and more easily understood and, until we know more about why ... rates change over time they may not prove appreciably less accurate than more detailed models."¹¹¹

As noted by Cox¹¹², ultimately the quality of forecasts depends upon the quality of data input, rather than the specific characteristics of the individual model.

For the purposes of this report therefore, the general type of forecasting model described above has been accepted. As detailed in Chapter 3, it has been attempted to expand the model to enable consideration of the supply and demand of secondary subject specialists. In addition, in an attempt to resolve at least in part, some of the uncertainties characterizing this type of approach, the implications of a select number of underlying assumptions have been examined. As a final contribution, an alternative demand methodology has been developed - either to be used separately, or in conjunction with the existent demand approach.

FOOTNOTES

- ¹ Education, Training and Employment, vol 1, p681. This statement implies an acceptance of the AEC surplus forecasts - a point certainly not granted by all educationalists. Burkhardt for example, concludes that the AEC predictions may prove "grossly exaggerated" (Burkhardt, 'Planning teacher supply - an accountability issue', p13.)

- ² In anticipating the situation from the 1970's onwards, Hall in 1965 wrote: "over wide sectors of the economy it will increasingly be the case that men and women will be chasing highly skilled jobs in a fashion which has not been known since the the 1930s. In the education profession ... the supply of potential staff will continue to increase at a rapid rate well beyond the time when the rate of increase in demand for their services will have fallen significantly". (Hall, A.R., 'Supply and demand', p52, in Wheelwright, E.L. (ed), Higher Education in Australia, Cheshire, Melbourne, 1965, pp44-65.)

- ³ Cited in: Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.

- ⁴ Cited in: Education, Training and Employment, vol 1, p681.

- ⁵ The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985.

- ⁶ Report of the Special Committee on Teacher Education, Teacher Education 1973-75, Australian Commission on Advanced Education, A.G.P.S., Canberra, 1973.

- ⁷ Cited in: Selby Smith, R., 'The criteria for the recruitment of students for courses of teacher education'. Paper delivered at

the 47th Congress, Australian and New Zealand Association for the Advancement of Science, Hobart, May 1976.

- ⁸ Cited in: Wilson, J.J., 'Supply and demand for teachers in Australian schools'. Paper delivered at a conference, Policy and Planning in Teacher Education, conducted by the Higher Education Policy Research and Evaluation Unit, Darling Downs Institute of Advanced Education, Toowoomba, August 1978.
- ⁹ For a listing of the various State inquiries, see: Burkhardt, 'Planning teacher supply - an accountability issue'.
- ¹⁰ Consider for example, Glover, J.D., 'Teachers in South Australia: estimates of the supply and demand 1978 to 1985'. A paper commissioned by the Committee of Enquiry into Post-Secondary Education in South Australia, January, 1978.
- ¹¹ Education, Training and Employment, vol 1, pp700-701.
- ¹² Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.
- ¹³ Selby Smith, 'The criteria for the recruitment of students for courses of teacher education'.
- ¹⁴ For example: Borrie, W.D., 'Demographic trends and education in Australia', in Bassett, Planning in Australian Education, Australian Council for Educational Research, Melbourne, 1970, pp197-226.
- ¹⁵ Ibid., p200.
- ¹⁶ Selby Smith, 'The criteria for the recruitment of students for courses of teacher education', pp2-3.

- 17 Statistics cited in: Burke, G., 'Manpower forecasting for teachers: performance and problems', Australian Bulletin of Labour, 1979, 5(2), pp16-33.
- 18 Based upon statistics in: Education, Training and Employment.
- 19 Australian Bureau of Statistics, Births, catalogue no. 3301.0.
- 20 For example, the enrolment statistics in Table 2 in: Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.
- 21 Anderson, 'Some implications of the reduced demand for school-teachers', p2.
- 22 Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.
- 23 Burkhardt, 'Planning teacher supply - an accountability issue', p4.
- 24 Australian Bureau of Statistics, Schools, catalogue no. 4202.0.
- 25 As remarked upon by the AEC Working Party in its 1978 report.
- 26 Caldwell, J.C. 'The Australian population', pp4-5. Paper presented at the National Inquiry into Teacher Education Conference on Social Change, held mid-1979.
- 27 Ibid., p5.
- 28 The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985.
- 29 Australian Bureau of Statistics, Schools, catalogue no. 4202.0.

- 30 Specifically, Tables 5.23 and 6.23, in: The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985.
- 31 Ibid.
- 32 As detailed in: Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.
- 33 As detailed in: Education Department of Tasmania, Research Branch, Teacher Education: Estimate of Required Recruitment to Departmental Studentships 1979-1987.
- 34 The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985, pp5-6.
- 35 Turner, M., The TEC Paper on the Supply and Demand for New Teacher Graduates in the 1980s: A Critical response, Federation of Australian Staff Associations, Melbourne, 1980.
- 36 The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985, p15.
- 37 Ibid., p15.
- 38 Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s, paragraph 15.
- 39 The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985, p13.
- 40 Ibid., p21.
- 41 Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.

- 42 Information from other States also questions the AEC estimates in this regard: for example in the South Australian inquiry, 'other' recruits were consistently less than one-half the AEC level. (Glover, 'Teachers in South Australia: estimates of the supply and demand 1978 to 1985'.)
- 43 The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985, p19.
- 44 The TEC Paper on the Supply and Demand for New Teacher Graduates in the 1980s: A Critical response.
- 45 Report of the National Inquiry into Teacher Education, (the Auchmuty Report), A.G.P.S., Canberra, 1980.
- 46 The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985, p23.
- 47 Glover reaches a similar conclusion. (Glover, 'Teachers in South Australia: estimates of the supply and demand 1978 to 1985'.)
- 48 Education, Training and Employment, vol 1, p683.
- 49 As in the case of the Tasmanian Department of Education, (see statistics in: Tertiary Education Commission of Tasmania Working Party, Teacher Supply and Demand in Tasmania, 1980-1990. Unpublished paper, circulated November 1979. It is of interest to note that the report is one of the few instances to have considered service personnel in preparing teacher forecasts.
- 50 Burkhardt, 'Planning teacher supply - an accountability issue', p6.
- 51 This view is not however, universally held. The Universities Commission in its 1975 report, explicitly stressed the need to

view teacher supply on an aggregate, national basis. (Cited in: Education, Training and Employment.)

- 52 The following details and statistics have been derived from two main sources:
Ahamud, B., 'Teachers in England and Wales' in Ahamud, B. and Blaug, M. (eds), The Practice of Manpower Forecasting, Elsevier, Amsterdam, 1973, pp261-284.
Williams, P., 'Too many teachers? A comparative study of the planning of teacher supply in Britain and Ghana', Comparative Education, 1977 (Oct), ppl69-190.
- 53 Cited in Williams, 'Too many teachers? A comparative study of the planning of teacher supply in Britain and Ghana', pl70.
- 54 Ibid., pl74.
- 55 Robinson, E., 'Many will be told they can take a course provided it is useless', The Times Higher Education Supplement, 22 August 1975, no. 200, p5.
- 56 Report of the Committee on the Future of Tertiary Education in Australia, Tertiary Education in Australia, (the Martin Report), Government Printer, Melbourne, 1964, vol 1.
- 57 Australian Education Council, 'A statement of some needs of Australian education', Sydney, 1963.
- 58 Australian Bureau of Statistics, Schools, catalogue no. 4202.0. (Differences between the data-bases used by the Martin Committee and provided by the Bureau of Statistics, need to be stressed. However, it is judged that any differences are of limited importance, in light of the extent of discrepancy between the Committee's projected and actual statistics.)

- 59 As cited in: The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985.
- 60 Based upon statistics cited in: Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.
- 61 Wood, W., 'Educational manpower in Australian schools', Australian Journal of Education, 1969, 13, ppl67-194.
- 62 Australian Bureau of Statistics. Schools, catalogue no. 4202.0. (Incomptability of data-bases, as discussed in reference to the Martin Committee forecasts, is again pertinent.)
- 63 As cited in: Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.
- 64 The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985.
- 65 As cited in: Working Paper on the Supply of and Demand for New Teacher Graduates in the 1980s.
- 66 McGrath, H.M., 'Direction and problems for future planning'. Paper presented at a conference, Policy and Planning in Teacher Education, conducted by the Higher Education Policy and Research Unit, Darling Downs Institute of Advanced Education, Toowoomba, August, 1978.
- 67 Ibid., pp4-5.
- 68 Ibid., p7.
- 69 Ibid., pp7-8.
- 70 Exceptions to this statement certainly exist: for example, Wood, 'Educational manpower in Australian schools'.

- 71 For details, see: Bassett, G.W., Planning in Australian Education, Australian Council for Educational Research, Melbourne, 1970.
- 72 Selby Smith, 'The criteria for the recruitment of students for courses of teacher education', p3.
- 73 Anderson, 'Some implications of the reduced demand for school-teachers', p7.
- 74 Selby Smith, C., 'An economic approach to teacher loss and retention', The Australian Journal of Education, 1973, 17(2), pp142-152.
- 75 Bassett, Planning in Australian Education.
- 76 Ahamud, 'Teachers in England and Wales', pp281-282.
- 77 Report of the Committee Appointed to Investigate and Advise on Class Sizes and Teaching Loads in Government Secondary Schools in New South Wales, Government Printer, Sydney, 1969.
- 78 Ahamud, 'Teachers in England and Wales'.
- 79 It is of interest to note in this context, that in Victoria during the mid-1970's, a sizeable lowering of the pupil-teacher ratio occurred in State schools. Reduction of class size however, was minimal: extra staff were mainly channelled into the development of career education, in-service training programs, curriculum development, etc. (Cox L. et al, Demand for Educational Manpower 1976-1982, Melbourne State College, Melbourne, 1976.)
- 80 Bassett, Planning in Australian Education.
- 81 Ibid., pp122-123.

- 82 Ibid., p123.
- 83 This is least true of the projection of new-graduate levels - where it requires about a 20% error to be equivalent to a 2% change in wastage. (Burke, 'Manpower forecasting for teachers: performance and problems'.)
- 84 Ibid., p24.
- 85 Report of the Committee Appointed to Review Teacher Education in Relation to the Needs and Resources in Queensland and to Make Recommendations on the Future Development of Teacher Education, Teacher Education in Queensland, (the Murphy Report), Department of Education, Brisbane, 1971.
- 86 Mr. L. Cartwright, Personnel Officer, Queensland State Department of Education, in an address delivered to the Queensland Association of Teacher Educators, 3 Oct 1980, Brisbane.
- 87 As reported in the 'Sunday Mail', 27 January 1980, p6.
- 88 In a public letter of 3 June 1980, from Mr. P. Darvall, President of FAUSA, to Professor P.H. Karmel, Chairman of the Tertiary Education Commission.
- 89 Ahamud, 'Teachers in England and Wales', p282.
- 90 Burke, 'Manpower forecasting for teachers: performance and problems', p24.
- 91 Burkhardt, G., 'Characteristics of teacher turnover in primary and secondary schools', in Davies, A. and Duke, C. (eds), The Retention of Teachers, Centre for Continuing Education, Australian National University, Canberra, 1971, ppl2-25.

- 92 Ibid.
- 93 Selby Smith, 'An economic approach to teacher loss and retention'.
- 94 Burke, 'Manpower forecasting for teachers: performance and problems'.
- 95 Based upon resignation statistics held by the Department's Research Branch.
- 96 Anderson, 'Some implications of the reduced demand for school-teachers', p3.
- 97 Report of the Committee of Enquiry into Post Secondary Education in South Australia, Post Secondary Education in South Australia, Adelaide, 1979.
- 98 Statements made by Dr. B. Carss and Mr. I. Cartwright, op cit.
- 99 A statement made by Dr. B. Carss, op cit.
- 100 Burkhardt, 'Planning teacher supply - an accountability issue', p13.
- 101 Ibid., p15.
- 102 Burke, 'Manpower forecasting for teachers: performance and problems', pp28-29.
- 103 Education, Training and Employment, vol 1, p685.
- 104 Burke, 'Manpower forecasting for teachers: performance and problems', p31.
- 105 With acknowledgements to Burke.

- 106 Ibid., p31
- 107 Education, Training and Employment, vol 1, p700.
- 108 Report of the National Inquiry into Teacher Education.
- 109 Ibid., paragraph 8.99.
- 110 A description of a range of manpower forecasting models may be found in: Smith, A.R. (ed), Manpower Planning in the Civil Service, Civil Service Studies no. 3, H.M.S.O., London, 1976.
- 111 Ahamud, 'Teachers in England and Wales', p278.
- 112 Cox et al, Demand for Educational Manpower 1976-1982.

CHAPTER 2

THE TASMANIAN DEPARTMENT OF EDUCATION

1 THE SECONDARY SCHOOL SYSTEM

(A) Background.

The range of primary and secondary schooling provided by the Tasmanian Department of Education, 1978-1980, is outlined in Figure 2.1.

Pupils enter the system between the ages of 4.5 and five years, at either the Kindergarten or Preparatory levels, and proceed through the primary sector until completing Grade 6 at about twelve years of age. Primary education is provided by primary schools and by the primary sections of district and district high schools.

Pupils proceed from primary education either to the secondary section of a district school or district high school, or to a comprehensive high school, to take up to a further four years of schooling in Grades 7-10. Pupils under some circumstances may leave school at the end of Grade 9, in which instance they may be considered for a Preliminary Schools Certificate; or pupils may leave after the full four years of junior secondary education when they may be granted a Schools Certificate. For those requiring senior secondary education, attendance at a matriculation college follows, usually for a further two years - where the successful completion of at least one subject, results in a Higher Schools Certificate.

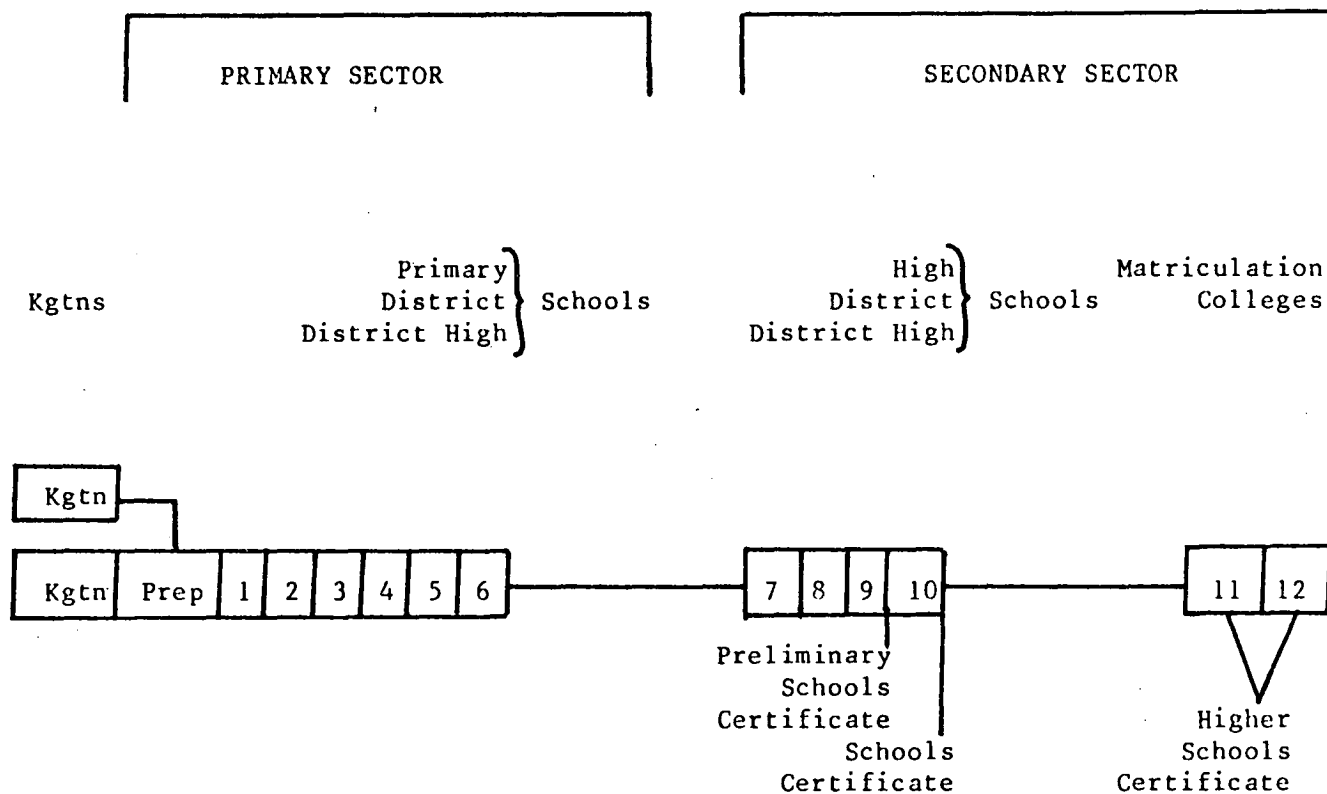


FIGURE 2.1: THE RANGE OF SCHOOLING PROVIDED BY THE TASMANIAN DEPARTMENT OF EDUCATION, 1978-1980.

Notes:

a. 'Kgtn(s)' refers to 'kindergarten(s)'.

There are also other types of schools administered by the Department. A small number of special schools with an accumulated annual enrolment of some 700 pupils, serve pupils with a range of mental or physical handicaps, for whom the above grade structure is considered inappropriate. Some junior and senior secondary subject options are currently provided by assorted technical and further education institutions; administrative changes introduced in 1979, outlined later in this chapter, will see expansion of such activities in this sector. Also, a very small number of other learning institutions are jointly administered by the Department and other government departments or agencies.

As may be seen from Figure 2.1, there are currently four main types of secondary schools - district schools, district high schools, comprehensive high schools, and matriculation colleges. The concept of the comprehensive high school is shared sufficiently by other State systems as to warrant little further explanation, except to emphasize that in most cases, since the late 1960's, Departmental high schools have provided only the first four years of secondary education. District schools, district high schools and matriculation colleges represent reasonably recent developments within the secondary system that are not common to all States.

(B) Development of district schools and district high schools.

The origin of these schools may be traced to an educational innovation made in Tasmania in the mid 1930's, whereby a number of 'area' schools were established as a means of providing post-primary education for rural children - albeit through courses which generally were only of three years' duration and were consistently less academic than courses provided for their urban counterparts. During the early 1960's, following the rapid development of comprehensive high schools, usually in urban areas, it became more apparent that rural pupils were

at a serious educational disadvantage. Hence the establishment of 'district' schools, whereby select area schools had their secondary sections both upgraded and expanded, as a means to improve rural secondary retention rates and to provide the full four years of junior secondary education. Largely for simplicity of nomenclature, from 1973, virtually all schools with both primary and secondary classes were called district schools - although the extent of improvement in secondary sections varied greatly.

The distinction between district schools and district high schools, represents the latest stage in the growth of rural education, and follows recommendations made by the District Schools Committee in 1978¹. Based on the demographic, economic, and educational conditions pertaining to existent district schools, the Committee recommended that:

- (i) in some instances, the secondary sections of district schools were to be phased out. Until such time as they offered exclusively primary education, they would continue to be termed district schools;
- (ii) the secondary sections of other district schools would be maintained and, if necessary, expanded to meet specified standards. These schools became district high schools.

(C) Development of matriculation colleges.

By the mid 1960's, the exceptionally low numbers of pupils in post-compulsory secondary education in Tasmania, meant that a relative scattering of high schools with extended secondary courses could adequately meet the demand for matriculation studies. Even within these select schools, the small numbers of senior students meant low class sizes in most subjects - and in the eyes of administrators, an uneconomic use of teacher resources. Accordingly, the junior sections of three high schools were phased out, allowing these schools to offer courses only for Years 11 and 12. As the result of having a student body with a minimum age of at least sixteen years, school conditions

with less emphasis upon highly structured learning and upon disciplinary aspects, were able to be established. It was intended that this would not only provide a more effective preparation for later attendance at tertiary institutions, but would also encourage higher numbers of students to continue their education to senior level.

In 1970, the term 'matriculation college'² was first used to distinguish those institutions offering exclusively senior secondary education. By 1975, all high schools were restricted to the provision of junior secondary schooling, at which time the number of colleges stood at its present level of seven.

The colleges have proved only a qualified success in increasing retention rates: although retention from Grade 10 to Grade 11 has risen markedly during the 1970's, it remains below that of other States. An initial explanation is the high level of population decentralization in Tasmania. Given that five of the colleges are located in the State's two main population centres, students are frequently required to live away from home if they wish to attend - a condition with which many feel unable to comply.

Additionally, in some ways at least, the provision of separate senior secondary institutions has proved counter-productive. Many Tasmanian educators feel that the physical separateness has emphasized the disjunction between junior and senior secondary schooling - reinforcing the idea that completion of high school for most pupils, means completion of secondary education.

In recognition of this, and also in response to other problems besetting senior secondary education, the recent Tasmanian Education: Next Decade (TEND) Inquiry³, presented the following recommendations:

- (i) that a number of appropriately-located rural high and district high schools be extended to include Years 11 and 12;
- (ii) and that in urban areas, the practice of distinguishing between

matriculation and technical colleges be discontinued. Instead, there should be developed a series of community colleges, to combine within the single institution the three streams of adult/recreational, vocational/technical, and general/academic education.

The former recommendation has been only partly accepted by the Department. Rather than senior secondary education being returned to some high schools, a select number of technical and further education centres in rural areas, will offer expanded senior study facilities. The Department has indicated its support for community colleges, by an administrative reorganization of senior secondary and technical and further education made in 1979, to be discussed later in this chapter. The first community colleges became officially established in 1980.

(D) Number of secondary schools 1966 - 1980.

The changes in secondary education described above, account for most of the fluctuation in the number and types of secondary schools over the past fifteen years, as shown in Table 2.1.

During this period, the number of high schools has remained fairly stable, increasing only to 36 by 1980 - effectively, to 34, considering that two of the schools were small unattached secondary units, catering for a total of only twenty pupils. Even allowing for the number of places freed by the removal of senior secondary students, the increase in the number of high schools seems ill-matched to the persistent growth in enrolments, 1966-1980. In 1966, junior high school enrolments stood at 17,927, peaked eleven years later at 23,524, and by 1978 had declined to 22,395⁴.

The consequence has been an overall expansion in the average size of high schools, as may be seen from Table 2.2.

In 1966, 40% of all high schools had a pupil enrolment less than

TABLE 2.1: TYPES OF SECONDARY SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1966-1980.

Year	Type of school			
	District High Matric			Total
1966	41	30	-	71
1967	42	30	-	72
1968	42	30	-	72
1969	43	30	-	73
1970	41	28	3	72
1971	41	28	3	72
1972	40	30	3	73
1973	39	30	5	74
1974	36	31	5	72
1975	37	32	7	76
1976	37	33	7	77
1977	35	35	7	77
1978	25	35	7	67
1979	25	35	7	67
1980	25	36	7	68

Source: Education Department
Report for the years 1966-1979;
 1980 statistics based upon Research
 Branch information.

Notes:

a. 'District' statistics 1966-1972
 include area schools. These
 statistics 1978-1980 pertain only
 to district high schools.

TABLE 2.2: SIZE OF ENROLMENT OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, AT AUGUST 1966-1980.

Year	Size of enrolment (no. of pupils)							All Schools
	less than 201	201 300	301 400	401 600	601 800	801 1000	more than 1000	
1966	-	-	6	6	12	5	1	30
1967	-	-	5	6	12	6	1	30
1968	-	-	3	6	11	7	3	30
1969	-	-	2	7	9	8	4	30
1970	-	-	2	6	6	9	5	28
1971	-	-	-	7	6	9	6	28
1972	1	2	-	7	6	9	5	30
1973	-	-	1	7	8	10	4	30
1974	-	-	-	7	9	10	4	30
1975	1	-	-	6	9	12	3	31
1976	1	1	1	5	11	10	3	32
1977	2	-	2	7	11	12	-	34
1978	-	1	-	10	11	11	-	33
1979	-	-	1	13	12	7	-	33
1980	1	-	1	14	16	2	-	34

Source: Education Department Report for the years 1966-1979; 1980 statistics based upon Research Branch enrolment information.

Notes:

a.1974-1977, one unclassified school excluded;
1978-1980, two unclassified schools excluded.

600, and only one school had more than 1,000 pupils. The average high school enrolment was just below 650 pupils. By 1971, the average school size had climbed to almost 800 pupils. By 1975, near the peak of junior secondary enrolments, a number of new schools had been established to help ease the pupil increase - allowing a drop in the average school enrolment to below 750 pupils. In 1978 at the time of the Tend report release, improvements in school size had continued, assisted by a decline in secondary enrolments. 33% of schools were smaller than 600; no school had an enrolment above 1,000; the average school size had fallen further to an enrolment of 700 pupils.

The issue of school size has been stressed, because of recommendations arising from both the Secondary Schools⁵ and TEND Reports. The latter for example presented the following view:

"(i) that a school of 400 full-time students is a size which would be most productive of teacher and pupil satisfaction, community involvement, and the economic and effective deployment of educational services, and (ii) that, as far as possible, schools should be planned to accommodate between 300 and 500 full-time students, and should, in no case, be allowed to reach the category of large schools of 750-plus full-time students".⁶

Accepting a maximum enrolment limit even of 700 pupils, means that in 1978, fourteen high schools would have been over-sized, on average by almost 150 pupils - the total equivalent of three new high schools. Had the limit of 500 pupils been enforced in that year, 26 high schools would have been over-sized by an average of 250 pupils - seemingly, requiring a staggering 13 new schools to remedy the situation.

The achievement of smaller high schools will be facilitated by the dwindling junior secondary enrolment. By 1990 for example, the projected fall⁷ will obviate the need for eight of the 13 new schools postulated above. Acting against this apparent saving, however, by

preventing the full use of existing school buildings, is the pattern of population movement in Tasmania. Particularly the development of large Housing Commission estates in suburbs peripheral to the major population centres, as a matter of policy, require the building of new local schools.

Reduced school size will have an impact upon teacher planning, which it is considered, will be two-fold:

(i) if present teacher allocation procedures which provide proportionally more staff for smaller schools, are maintained, a system of smaller high schools will require an enlarged secondary teaching force;⁸

(ii) smaller schools may also change the concept of secondary teachers as subject specialists.

Both these points are treated at some length, later in the report.

2 SECONDARY SCHOOL TEACHERS

(A) Background.

All Departmental full-time staff are drawn from the following three categories:

- (i) the teaching service, employed under the Education Act of 1932;
- (ii) administrative/clerical officers, employed under the Public Service Act;
- (iii) miscellaneous maintenance staff.

In addition to part-time and casual teachers, the Department also provides subsidies to trainee teachers in pre-service training, under the provisions of a studentship scheme.

Education Act appointees include not only school-based teachers, but also personnel in Head and Regional Offices, and in service branches; and range in promotional status from a base-grade teacher or education assistant, to the position of Director-General as permanent head of the Department.

Within each secondary school, Education Act appointees consist of teachers in all promotional and non-promotional positions, and also include teacher-librarians, laboratory technicians and in matriculation colleges, counsellors. (The latter are distinct administratively and functionally from officers in the Educational Guidance branch.)

In secondary schools, teachers form the bulk of Education Act appointees. In 1978, there were about 45-50 teachers per high school or college: compared with usually one teacher-librarian, at the most two laboratory technicians and in colleges, one or two counsellors. For the remainder of this chapter only, the term 'teacher' unless otherwise indicated, has been applied to all school-appointed Education Act appointees.

(B) Secondary teaching force growth 1966 - 1980.

Table 2.3 shows for the last fifteen years, the increase in secondary teacher numbers. For purposes of comparison, secondary enrolments for the same period are also shown.

Both teacher and pupil statistics emphasize the great expansion of the secondary sector, even over this restricted period. By 1978, teacher numbers had increased by nearly 50% from the level thirteen years earlier. The increase considerably outpaced the growth in enrolments, as evidenced by the fall in the gross secondary pupil-teacher ratio from 15.2 in 1966, to 13.0 in 1978. Indeed, since 1976, the combined secondary enrolment has been dwindling, whilst teacher growth has continued, albeit at a reduced rate.

Educational planners consider it most unlikely that the growth pattern in Table 2.3, will continue. Once the staffing betterment targets which underly present teaching planning, have been achieved by 1983 or thereabouts, reduced secondary enrolments are likely to be met with a constant pupil-teacher ratio⁹. The consequence of this policy will be a secondary teaching force that will probably reach maximum size in 1984 (2,400 teachers), and thereafter decline by around fifty teachers annually, at least until 1990 - at which time teacher numbers will be comparable to the 1975 level¹⁰. Barring a sizeable reversal of teacher wastage trends, the reduction in the number of teachers will also be accompanied by a commensurate decline in recruitment needs.

The growth factor 1966-1980, is differentially common to most of the promotional categories of school teachers, as is shown in Table 2.4. Senior master positions for example, have increased from 205 in 1966 to 453 in 1978 - a growth of some 120%. In contrast, the number of base-grade positions have proportionally increased by only 35%. (Because teachers in promotional positions have reduced loadings¹¹, it can be consequently calculated that the gross increase of 719 teachers

TABLE 2.3: NUMBERS OF FULL-TIME SECONDARY TEACHERS PER TYPE OF SCHOOL IN THE TASMANIAN DEPARTMENT OF EDUCATION, AT AUGUST 1966-1980.

Year	Number of teachers:			All Tchrs	All Pupils	Ptr
	District High Matric					
1966	260	1227	-	1505	22911	15.2
1967	258	1264	-	1539	23594	15.3
1968	284	1294	-	1585	24701	15.6
1969	291	1343	-	1646	25830	15.7
1970	273	1297	137	1718	26829	15.6
1971	243	1298	202	1754	27807	15.9
1972	239	1356	229	1834	28475	15.5
1973	253	1385	267	1908	29074	15.2
1974	261	1448	281	1992	29279	14.7
1975	218	1510	298	2026	30042	14.8
1976	260	1562	303	2125	30183	14.2
1977	256	1581	296	2133	29616	13.9
1978	266	1636	322	2224	28843	13.0
1979	278	1663	333	2274	28193	12.4
1980	304	1693	367	2364

Source: Education Department Report for the years 1966-1979; 1980 teacher statistics based upon Research Branch information.

Notes:

a. 'District' statistics 1966-1972 include secondary teachers in area schools. These statistics 1978-1980 pertain only to teachers in district high schools.

b. Matriculation teachers prior to 1974, were stationed in comprehensive high schools.

c. 'All pupils' and 'All teachers' may include small numbers of secondary pupils and teachers in primary schools.

d. Pupil enrolment data for August 1980 not available.

TABLE 2.4: THE PROMOTIONAL STATUS OF FULL-TIME SECONDARY TEACHERS IN THE TASMANIAN DEPARTMENT OF EDUCATION, AT AUGUST 1966-1980.

Year	Promotional status				Total
	Prncpl	Vice prncpl	Senior master	Base teacher	
1966	71	31	205	1198	1505
1967	72	41	221	1205	1539
1968	72	55	247	1211	1585
1969	73	63	263	1247	1646
1970	72	68	281	1297	1718
1971	72	69	313	1300	1754
1972	73	67	317	1377	1834
1973	74	82	365	1387	1908
1974	72	83	414	1423	1992
1975	76	92	418	1440	2026
1976	77	92	438	1518	2125
1977	77	92	430	1534	2133
1978	67	80	453	1624	2224
1979	67	81	424	1702	2274
1980	68	82	442	1772	2364

Source: based upon Education Department Report for the years 1966-1979; 1980 statistics based upon Research Branch information.

Notes:

a. Estimates only for principals, vice principals and base teachers.

1966-1978 may be reduced in fte terms, by some 50 teachers.)

The main point of relevance to teacher planning emerging from Table 2.4, is the reduced promotional prospects of teachers, from 1974 onwards. In 1966, the ratio of base to senior master positions was 5.8:1; by 1974 it had reduced to 3.4:1, but thereafter has slightly worsened to reach 3.6:1 in 1978. The worsening of promotional prospects assumes added significance when coupled with the reported - although unconfirmed - trend that during the early and mid 1970's, promotional positions became increasingly filled by relatively young applicants: often teachers having only the minimum required years of service. The consequence has been a promotional bottle-neck as, in the short term at least, positions become vacant mainly as the result of the further promotion of incumbents - rather than being influenced by teacher retirements.

The extent of the bottle-neck is illustrated by the decline in the number of promotional vacancies over recent years. During the early 1970's for example, secondary promotional vacancies were as high as 150 or so, per year. The number of vacancies effective for 1980, had fallen to 74¹².

There is evidence to suggest that as promotional and other career prospects diminish, teachers will tend to seek positions in other, more promising professions.¹³ Although in Tasmania these areas are limited in number, automated data processing and the technical section of the technical and further education sector are two examples of areas undergoing expansion and/or experiencing manpower shortages. Against this background, it is possible that there may be some recovery in teacher turnover rates.

The number of promotional positions available to a particular school is effectively determined by the enrolment level of that school. Given the fall-off in secondary enrolments and given also the movement towards smaller schools, if this issue does become a problem,

it will need to be resolved only through deliberate policy changes.

(C) Secondary teacher wastage 1967-1979.

One further aspect of the secondary teaching force of direct relevance to teacher planning, concerns teacher wastage - specifically resignations, which account for the vast bulk of teacher loss. Table 2.5 shows resignations from high schools and matriculation colleges, 1967-1979. (The restricted time span has been caused by data unavailability.)

The dominant feature is the dramatic drop both numerically and proportionally, in resignations. From the highest point in 1968, at 18% of all permanent teachers, the secondary resignation rate has dropped to below one-quarter that level by 1979. Put numerically, in 1979 an extra 250 or more teachers were continuing in service into the next year, who would have resigned had the rates of the late 1960's persisted. Had the resignation rate dropped, say only to 10%, by 1979, an extra 120 teachers would be leaving the service annually.

The high levels of teacher loss during the 1960's, prompted the Department to research the reasons for resignation. As a consequence, several improvements in working conditions were introduced - including more liberal study and travel leave provisions. These provisions, together with reduced alternative career opportunities, and fears of re-entry difficulties in a time of teacher surplus, are most commonly advanced to explain the prevailing low loss rates.

It remains uncertain whether the 1979 wastage level will continue to decline. In its 1979 teacher forecasts¹⁴, the Department assumed that secondary teacher resignations would fall at the most, a further 0.5% from the 1978 level, and then remain constant for the next few years at least, to contribute to a total secondary wastage of 7.0-7.5%. At some point during the 1980's, it was expected that

TABLE 2.5: SECONDARY TEACHER
RESIGNATION RATES IN THE TASMANIAN
DEPARTMENT OF EDUCATION, 1967-1979.

Year	Number of resigntns	Number permanent staff	Resigntns (%)
1967	192	1219	15.7
1968	236	1292	18.3
1969	197	1357	14.5
1970	231	1413	16.3
1971	206	1499	13.7
1972	161	1552	10.4
1973	179	1610	11.1
1974	143	1689	8.5
1975	158	1805	8.7
1976	140	1860	7.5
1977	128	1891	6.8
1978	120	1987	6.0
1979	83	2037	4.1

Source: Research Branch reports.

Notes:

a. 'Secondary' statistics in this table are limited to high school and matriculation college Education Act appointees in permanent positions.

resignations would again rise. The initial part of the assumption has already been proven in error.

3 SECONDARY TEACHER PREPARATION

(A) Background.

By the early 1960's, the training of secondary teachers in Tasmania was undertaken mainly by the University of Tasmania, except for very small numbers of students at the Launceston Teachers College and at the Hobart Technical College. The next five or so years produced a splintering of pre-service training, so that by 1970 there were six training centres, mainly single-purpose: the University, the Hobart and Launceston Teachers Colleges, the Tasmanian School of Art, the Conservatorium of Music, and the Hobart Technical College. This trend was reversed during the 1970's and by 1980, secondary teacher training was restricted to the University and the Tasmanian College of Advanced Education, Southern and Northern Divisions¹⁵.

The 1980 decision that the teacher training courses provided by the Southern Division of the Tasmanian College of Advanced Education, be absorbed by the University, means that during the 1980's, the latter institution will again be responsible for the bulk of secondary teacher training.

Most students currently enrolled in teacher education courses are sponsored under the provisions of a studentship training scheme. The scheme is broadly comparable with those previously provided by other States: in return for a financial subsidy during training, students undertake to serve the Department for a number of years upon graduation. (There are additional advantages conveyed by the scheme: years of training contribute to long service leave entitlements, etc.)

In a given year, over two-thirds of entrants to the studentship scheme are recruited directly from the Department's matriculation colleges or from registered secondary schools. The balance of recruits are: students part-way through an undergraduate course of

study; graduate students wishing to undertake a Diploma of Education; teachers wishing to return to full-time study to improve their qualifications; and adults from other fields of employment seeking to gain the qualifications necessary for a transfer to teaching. Out-of-State recruitment to the scheme, certainly in the three years most central to this report, has virtually ceased¹⁶.

For the years 1978-1980, the Department's employment of new graduate teachers - most markedly in 1980 - has been largely restricted to studentship trainees¹⁷. This development has been caused by the unexpected fall in teacher resignations in past years, which has limited teaching vacancies mainly to those to whose employment the Department is 'committed' under the provisions of the scheme.

(B) The selection process.

Selection for a studentship is hinged on the following three factors¹⁸:

- (i) academic achievement - based upon various aspects of scholastic achievement at Higher School Certificate level, or, where appropriate, upon past or present performance at tertiary level;
- (ii) personal suitability - as indicated by reports prepared by school personnel, or by interviews held by Studentship Officers, relating particularly to intrinsic motivation to enter teaching;
- (iii) compatibility of Departmental staffing needs with chosen field of training.

The third selection criterion is of critical importance to establishing a secondary teacher planning methodology, capable of responding to the concept of the teacher as a subject specialist. In recognition of this, in 1973 the Department attempted a revised approach to studentship selection. The chief feature was an up-grading of the importance of meeting Departmental staffing

¹⁹
needs - needs which within the secondary sector, were pitched at the level of each individual subject.

Thus in 1974, given the development of information about future specialist staffing needs:

"it was felt appropriate to allocate studentships more on the basis of meeting these needs than was previously the case. In theory at least and sometimes in practice, this had the effect of enhancing ... or reducing the prospects (of applicants according to intended field of specialisation). To the extent that this principle was applied, it had the greatest relevance to University school-leaver applicants"²⁰.

It would seem both from the above statement and from the practical results, that the application of this new policy was less than total. In 1974 the University applicants for whom the principle was reportedly of most relevance, were allotted to only three training courses: English/Social Science, where the intake was 65% above the desired level; Mathematics/Science, almost 30% below the desired level; and Languages, 33% below²¹.

For the period 1974-1978, the recruitment of studentship-holders to meet precise Departmental staffing needs was not rigorously enforced. As an illustration, consider the following information available for 1974-1976, comparing the actual intake of secondary trainees per subject area with anticipated staffing needs²².

During the three years, a total of 150 English/Social Science and General teachers in excess of requirements, were trained under the scheme. In the same period there occurred sizeable shortfalls in other specialities, particularly in Commerce (a shortfall of more than 50% of requirements), Home Economics and Music (in both instances a shortfall of some 33%). Considering that it is these years' trainees who are presently being appointed to secondary schools, it is not

surprising that the Department is currently most in need of further Commerce, Home Economics and Music specialists, and to a lesser extent, Mathematics and Science teachers. On the other hand, it has a surplus of English and Social Science teachers²³.

It is judged to be a fair comment that until 1979, compatibility between staffing needs and applicants' training specialities was of extremely limited influence. Using as a basis not so much the data developed in 1973, but rather the less formal estimates derived from schools and Regional Offices, Studentship Officers encouraged applicants to train in areas of most use to the Department, but rarely made selection conditional on a willingness to so comply. Exceptions to this certainly existed, but as isolated instances rather than as part of a generally applied policy.

The failure to maintain the 1973 selection policy can be traced to two factors:

- (i) the absence of systematic research data to enable a precise projection of secondary staffing needs. The data-base used in 1973, was intended only as a starting point to a comprehensive statistical foundation. The later reliance upon the experience and impressions of individual officers, has meant that however valid these impressions might be, it has been extremely difficult to quantify them with confidence;
- (ii) the ratio of applicants to secondary training positions, over the most recent years, being of the order of 2.5:1. Considering that the number of successful secondary applicants who decline a studentship might be as high as 50 per year²⁴, then there are often inadequate numbers of suitable applicants in some subject specialities²⁵.

If the need is considered of sufficient urgency by Departmental planners, both problems can be resolved - the former either along the lines developed in this report or through an alternative methodology; the latter, by a number of policy options, ranging from the provision of studentships for select training courses only, to differential

rates of subsidy across courses²⁶.

Financial cut-backs made by the State Treasury affecting 1979 studentship expenditure, made it necessary to reduce the amount of subsidy paid to new trainees, if required recruitment levels were to be achieved for that year. Further financial restrictions for 1980, could not be so absorbed: in this instance, recruitment was curtailed to a level just over one-half that of the previous year.

The joint effect of financial restrictions and a growing imbalance in the supply and demand of some subject specialists, has been that from 1979 onwards, the selection of new trainees has been significantly influenced by choice of speciality. In the secondary sector for example, the current practice is to allocate²⁷ the available number of new studentships across areas of speciality, and to award them only if there are suitable applicants expressing interest in appropriate training courses.

(C) Growth of the studentship scheme 1966-1980.

The development of the Department's studentship scheme has been characterized by two main trends.

First, the length of pre-service training has steadily increased²⁸. In 1966, 337 students graduated from the scheme after having spent an average of 2.2 years in training. Of these, 18% had spent one year in training, 60% two years and the remaining 22% three or four years. In 1978 there were 519 graduates who on average had been in the scheme for 3.1 years. Of these, 21% had spent one year in training; 7% two years; 19% three years; and 52%, four or more years.

This increased training period has been occasioned by the expansion in Teachers College/Tasmanian College of Advanced Education

training courses. By 1966, effectively all College courses were of only two years' duration - as were some courses provided by the University. With four-year courses for University entrants becoming the norm from 1968 onwards, and with the steady development of three and four-year courses in the College sector, the time required for the preparation of teachers correspondingly lengthened.

The Department's present policy is to provide four years of training for all studentship-holders "who are both capable and desirous of accepting it"²⁹. In a small number of cases, select students are permitted to complete a fourth (Honours) year at University, and then to study for a Diploma of Education the following year - still under the benefits of the studentship scheme.

The second trend in the scheme's development concerns the growth of the total studentship establishment - a growth both absolute and also relative to the size of the teaching force³⁰. In 1966, there were 913 students in training, which represented one trainee for every 3.5 teachers then employed. In 1978 trainees totalled 1,740, one trainee for every 2.4 teachers.

This growth may be seen partly as the consequence of lengthened pre-service training: as duration increases, total trainee numbers must also increase if the planned levels of output are to be achieved. The other major cause has been increased teacher demand - with the resultant recruitment needs until most recently, being only partly alleviated by the decline in teacher wastage.

Assuming the continuation of the studentship scheme, it seems likely that in a secondary context, a further increase in the duration of training will occur, possibly to the point where all studentship-holders train either for one year only or for four or five years.

Despite the consequent pressure that increased duration of

training would cause, further growth in size of the studentship establishment seems unlikely. Apart from political and economic factors, the decline in total Departmental teacher demand projected at least until 1988, will mean a reduction of some 25% in required studentship output by that time, compared with 1978 levels³¹. Secondly, the prevailing low teacher wastage rates, further obviate the need for a large number of trainees.

Figure 2.2 shows for the period 1966-1980, total numbers of primary and secondary trainees recruited to the studentship scheme and the intended length of their training. Over the past six years, between 55-60% of recruits shown in the diagram, have intended teaching in the secondary sector.

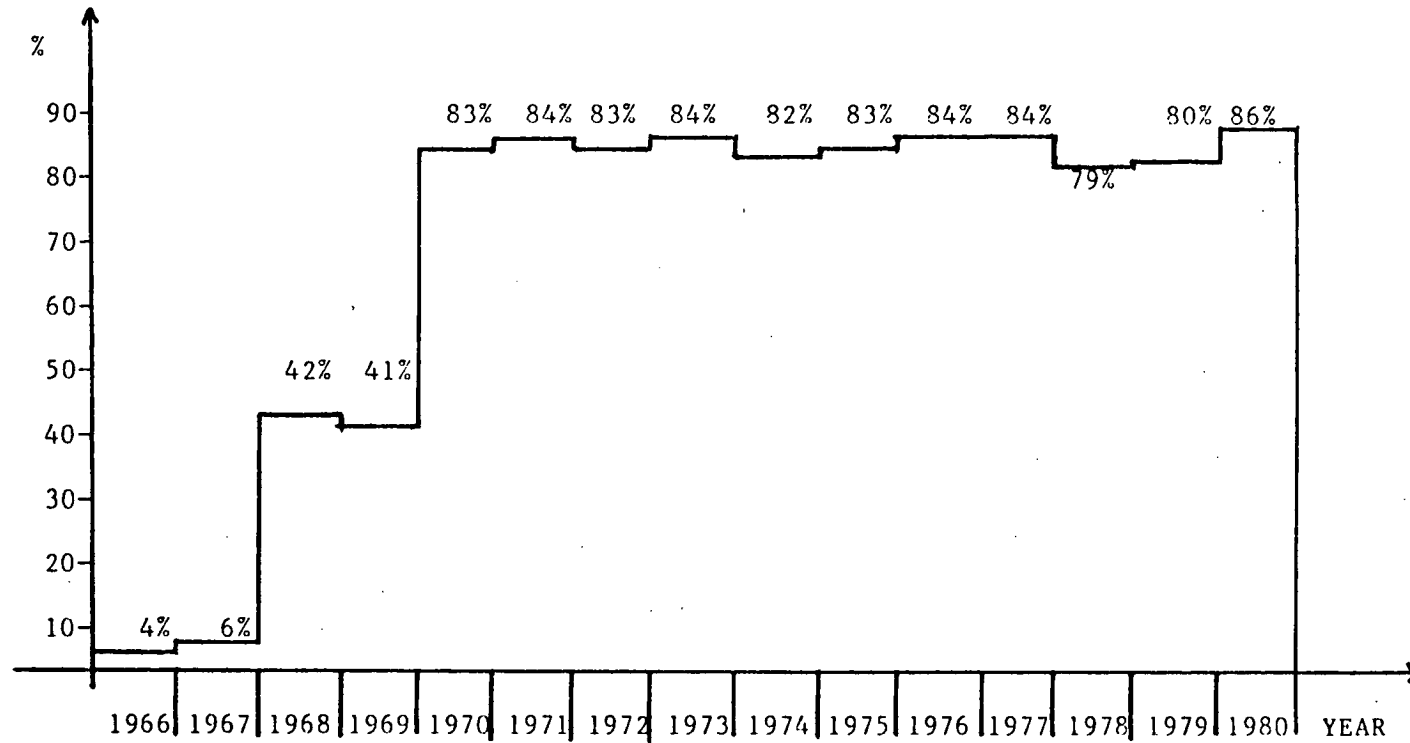
(D) Secondary teacher induction.

The induction of new recruits in the teaching service may take numerous forms: support and assistance from both professional associations and from experienced colleagues; opportunities for observing other teachers' methods; an orientation into the new school and its community, etc. However, it seems that three specific concessions are of greatest value to beginning teachers³²:

- (i) reduced teaching load;
- (ii) reduced range of teaching content;
- (iii) reduced class sizes.

The assumption is that formal teacher preparation does not cease with completion of pre-service training, and that, accordingly, a first-year teacher should not be regarded as a full replacement for an experienced teacher.

Notwithstanding the provision of a Beginning Teacher Counsellor in each Regional Office, the Department's teacher induction procedures are presently limited. Despite the Tasmanian Teachers' Federation policy that new teachers should have reduced loadings, staffing



Recruits to studentship scheme:

1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
392	404	433	491	455	569	490	486	574	602	571	553	582	538	315

FIGURE 2.2: PROPORTIONS OF RECRUITS TO THE TASMANIAN DEPARTMENT OF EDUCATION'S STUDENTSHIP TRAINING SCHEME INTENDING TO UNDERTAKE THREE OR MORE YEARS OF TRAINING, 1966-1980.

Source: Education Department Report for the years 1966-1979; 1980 statistics based upon Research Branch information.

allocation procedures make no explicit allowance for this factor³³. Despite the belief held by over one-half of all school principals that new teachers have been inadequately prepared for service, only 4% are always prepared to allow these teachers a reduced load³⁴. In 1977, in regard to both primary and secondary recruits³⁵:

- (i) 30% received a reduced work load;
- (ii) 14% received a reduced range of teaching content;
- (iii) 21% received reduced class sizes.

In its consideration of this issue, the Secondary Schools Report recommended that "the Education Department should give priority to a betterment of staffing levels sufficient to enable schools in their organization of staff, to provide a reduced work load for beginning teachers"³⁶. It further recommended that the special support given to first-year teachers, not be limited just to the first few weeks of first term, but be extended throughout the year. In order to achieve this, a tutor-teacher in each school was to be nominated to guide, assist and monitor the work of beginning teachers.

Both recommendations have obvious implications in planning teacher demand. The extent to which the former aspect has been observed, will be discussed in a later chapter.

(Surprisingly, the TEND Committee has made little mention of teacher induction. Throughout the report, induction seems to have been subsumed as part of the broader issue of in-service education - a topic which although of relevance to teacher supply and demand planning, lies beyond the scope of this report.)

4 SECONDARY TEACHER ALLOCATION

(A) Organizational background.

The organizational structure presently underlying the provision of primary, secondary and further education by the Tasmanian Department of Education is three-tiered: a central administration at Head Office in Hobart, under the Director-General and the Directorate; regional directorates in the northwest (Burnie), north (Launceston) and in the south (Hobart); and at a third level, the school administration headed by the principal. This structure is outlined in Figure 2.3.

The Directorate in its present form, is a very recent development. Until 1979, three deputy-directors of primary, secondary, and of technical and further education, were administratively responsible to the Director of Schools and Colleges, who represented all three sectors at Directorate level. A series of TEND recommendations were aimed specifically at bonding the technical and further education sector with primary and secondary education, thereby allowing the Department to provide the one integrated educational service. Accordingly, in 1979 the positions of Directors of Primary, Secondary and Further Education were created and the position of Director of Schools and Colleges abolished. The Director of Further Education was given responsibility for senior secondary education, technical education and adult education - with the unification of these three strands underlying the concept of community colleges.

In broad terms, Head Office is concerned with planning, determining policy, monitoring and generally administering all those educational elements shared by schools and regions. Foremost amongst its functions is the responsibility for personnel matters, including recruitment. Whilst handling matters relating to salary, working

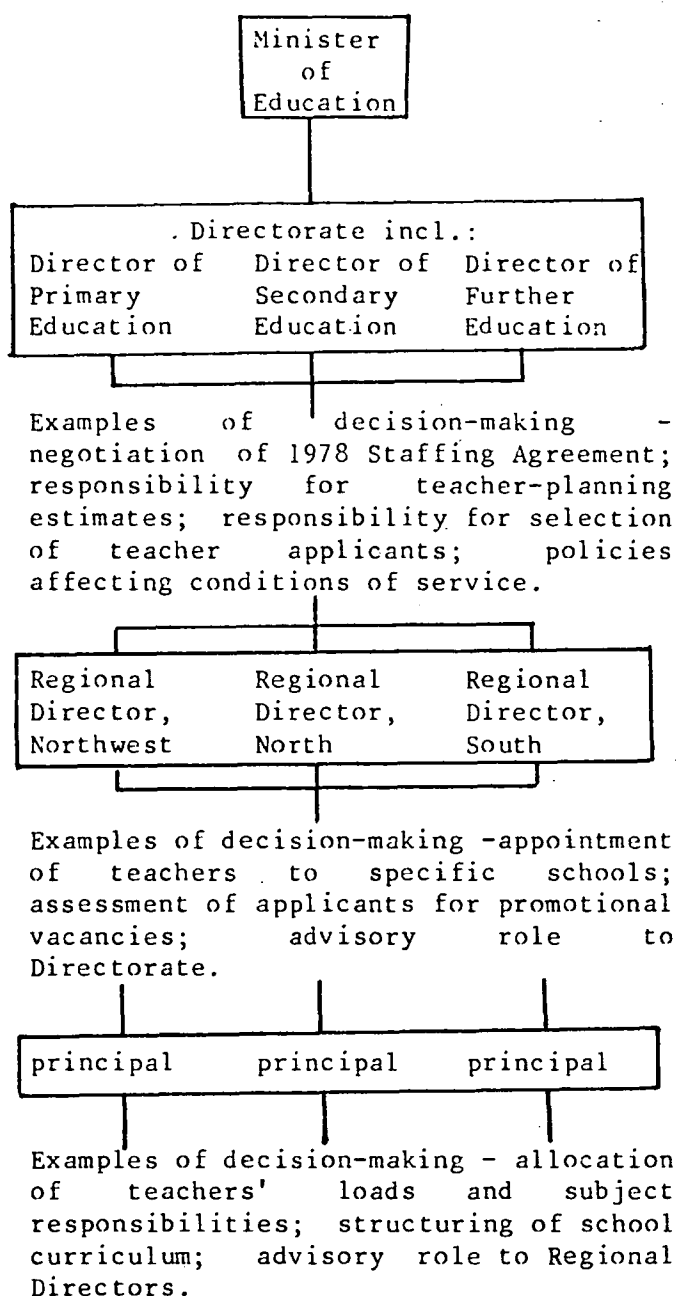


FIGURE 2.3: THE ADMINISTRATIVE STRUCTURE GOVERNING THE PROVISION OF SECONDARY SCHOOLING IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1980.

conditions, promotions etc., Head Office through its Personnel Branch and Studentship Office also plans for an adequate supply of trained teachers for all schools and branches of the Department.

The development of regional organization³⁸ spans the last twenty years, but it was not until 1973 that the decision to decentralize the staffing of schools, led to a full and formal division of the Department into the three present regions.

Apart from a Regional Director and clerical support staff, each region is also staffed by superintendents. The latter have responsibility in one of the areas of infant, primary, secondary or most recently, further education, and function as field officers in determining the needs of schools and colleges. Presently, the Northern and Northwestern Regions each cater for just over 25% of all primary and secondary pupils in the State, with the Southern Region taking responsibility for the balance.

In addition to maintaining a very strong advisory role in regard to decisions made in Head Office, the Regions exercise a considerable degree of autonomy in other fields: e.g. assessment of teachers for promotional purposes and provision of limited teacher induction and other development services, responsibility for school maintenance and minor works programs. Although both the determination of teacher recruitment levels and the various processes of appointment (including selection) are undertaken by Head Office, the Regions are responsible for the allocation of teachers to specific schools and for maintaining each school's staffing complement throughout the year.

Within the framework encompassed by Head Office and Regional functions, each school principal is responsible for administration at the school level. In addition to the daily running of the school, the principal also needs determine a range of administrative and educational strategies: whether classes are to be 'streamed'; whether open or traditional education will prevail; the extent and

nature of liaison with the community; and to a large extent, which subjects will be offered and who will be teaching in each area. The degree to which other school staff are involved in decision-making, is also very much at the discretion of the principal.

(B) The secondary teacher quota.

The starting point to determining the secondary teacher establishment for a given year, is the 1977 Staffing Agreement reached between representatives of the Department and the Tasmanian Teachers Federation. The Agreement summarised earlier discussions aimed at reducing the loadings of teachers in various promotional and other categories. In order that these reductions might be introduced without entailing an enlargement of class sizes or otherwise detrimentally affecting educational programs and services, the Agreement quantified certain expansions in the primary and secondary teaching forces that would subsequently be required, over the period 1978-1980.

The Department's teacher planning model, as described in the previous chapter, makes use of the assumption of improved staffing standards in some of its projections. The underlying reasoning is that the specified extent of annual improvement in the pupil-teacher ratio, would allow the extra teacher numbers formally accepted in the Agreement. The application of this improved pupil-teacher ratio to an expected secondary enrolment for a given year, yields the estimated teacher demand - which number of teachers, once accepted by the State Treasury in the form of salary estimates, becomes the total secondary quota for that year.

For administrative purposes, this quota is then further analysed into district high school, high school and matriculation college quotas. These separate quotas are fixed, ultimately by the expected enrolments in each sector.

Political decisions announced towards the end of 1979, have meant the apparent³⁹ deferral of the 1980 staffing targets stipulated by the Agreement. Current Departmental planning assumes that these targets will be achieved 'within the life of the present State Parliament'⁴⁰ (i.e. by 1982 or 1983) - which assumption has been conditionally affirmed by the State Minister for Education. It is also assumed that economic and other considerations make it likely that improvements in the pupil-teacher ratio thereafter, will be minimal⁴¹.

The above procedure arising from the Staffing Agreement relates almost entirely to full-time teachers. The number of casual relief staff who may be employed in a given year, is broadly estimated by the Personnel Section of Head Office, after a consideration of the numbers of permanent teaching staff likely to be absent due to the various forms of extended leave, secondment to service branches, etc. A commensurate budgetary allocation is then made by Treasury. Additionally, a small allocation is made annually for the employment of a number of part-time teachers to be appointed to schools considered by Head Office to have particular needs.

(C) Secondary staff allocation.

Having described the means by which the total secondary staff quota is determined for each year, it remains to consider the process by which each secondary school or school sector, receives its specific staffing allocation. There are two general components to this process:

- (i) the calculation of each school's overall teacher entitlement;
- (ii) the matching of each school's teacher specialist needs with available staff.

Staffing entitlement is calculated by the secondary schools staffing formulae. Appendix 1 shows the application of the 1979 high

schools' staffing formula for two schools with enrolments of 450 and 750 pupils. The two applications illustrate the way in which present teacher allocation policy slightly favours smaller schools in terms of allocated staffing resources.

It has proven difficult to devise a satisfactory, comparable formula for the small secondary sections characterizing most district and some district high schools. Decisions generally are taken on the basis of what is necessary to cover the needs of each individual school, and the appropriate numbers of teachers are appointed accordingly. The small number of schools and of teachers involved, readily allow this less-than-systematic approach.

For the twelve major district high schools, each of which has a secondary enrolment approximating 100 pupils, a modified form of the high school formula is used. In 1979, the two principal modifications were - the staffing index was derived by using the divisor 21.0, and each school had the option of foregoing a laboratory technician in return for an extra class teacher.

Matriculation college staffing is calculated by a different formula again. Proportionally, more senior staff are allocated. Also ~~the~~ the teaching loads of staff are based upon the number of pupil contacts, instead of proportion of class contacts per school cycle. Appendix 2 illustrates the application of this formula.

It has been mentioned in this chapter that recommendations arising from both the Secondary Schools Report and from the TEND Report have stressed the desirability of smaller secondary schools. A broad assessment has been made of the number of additional high schools needed, had the recommendations been enforced in 1978.

An assessment may now also be made of the impact of these recommendations upon teacher numbers. If the 22,375 high school pupils enrolled at August 1978 had been evenly distributed across the

33 high schools, the resultant enrolment would have been 680 pupils per school. The high school staffing formula would have allocated each school a teaching complement of 47 teachers, totalling 1,551 at a system-wide level. Had the 1978 pupils been organized in schools each of 500 pupils, the resultant 45 high schools would have required a total of 1,665 teachers - or an extra 114 teachers. These additional staff would have required actual 1978 high school teacher recruitment to have been increased by approximately 50%, (see Table 4.8 in Chapter 4).

The second component of teacher allocation, concerns matching a school's specialist needs with the subject specialities of teachers available for appointment.

Towards the end of a school year, each principal has a fairly precise knowledge of the number of pupils who will enter his school the following year. By this time, the range of subjects both compulsory and optional which will be offered in the following year, have been largely organized into a timetable. With some three-quarters of pupils more or less locked into a given course of study, it is also possible to estimate with confidence the following year's enrolments in each subject. Enrolments and class organization are then used to estimate the overall number of specialists required for each subject.

Also by the end of a school year, the principal largely knows how many of his staff will be remaining at his school for the next year. Given the school staffing quota and the subject specialities of those teachers on hand, it becomes a matter of arithmetic to calculate both the number of new appointments that the school will be permitted, and the preferred breakdown of these appointees into fields of specialisation.

At this point the regional structure of the Department becomes effective. Late in third term, Regional superintendents, through

consultation with their principals, assess the total recruitment requirements per speciality for their region, within the framework of the staffing quota. Directors and superintendents from all three Regions then meet to arrange the regional allocation of recruits and teachers seeking transfer. Regional allocation is determined not only by specialist staffing needs, but also by each recruit's extent of geographical mobility, preferred subject area, preferred type of school, etc.

Once the allocation for a given Region has been made, specific school appointments are then considered. Within each region, further meetings between principals and regional officers result in the distribution of teachers across schools, according to their training and/or experience, relative to each school's needs. Most noticeably where there is a widespread shortage or excess of particular specialists, the resultant school staffing complements may well represent a compromise between what an individual principal may have sought, and the needs of other schools.

The means by which any specialist shortfalls arising from such a compromise are resolved in the distribution of teaching loads within a school, are at the discretion of the principal. In most past instances, limited further recruitment has occurred during the year as a result of teacher resignations: given availability of appropriate personnel, this has afforded an opportunity to at least partly restore any needed balance to a school's staffing complement. This particular option is likely to be severely curtailed for the immediate future, due to prevailing low teacher wastage rates.

5 TEACHER SUPPLY AND DEMAND

The AEC Working Party estimated that in Tasmania, there would not be a teacher surplus of the magnitude predicted at a national level.⁴² It concluded that if improved staffing standards were provided 1978-1985 for the primary and secondary sectors, there would in fact be a slight shortfall by 1985. All shortage would be in the secondary sector - such that by 1985, only 90% of demand would be met. If constant staffing standards were assumed, by 1985 the surplus would be almost 10% above requirements. These estimates were based upon teacher graduation levels constant with the 1977 situation.

More recent estimates have been provided by the Tertiary Education Commission of Tasmania Working Party, which in its 1979 analysis⁴³, used a planning model equivalent to that of its parent-body (as previously described). It was concluded that supply and demand would be in broad balance from 1982 onwards, only if specified reductions in pre-service intake occurred: for the period 1980-1986, intake would need to be reduced by around 25% of the 1979 level. It was further estimated that for 1980 and 1981, there would be an annual excess of some 100 primary and secondary teachers.

Both sets of forecasts have failed to anticipate fully, the decline in teacher wastage. The AEC Working Party put wastage at 10%; the Tasmanian Working Party assumed 8.5% wastage. Actual wastage for 1979, was at most, 7.0%⁴⁴.

The consequence is an actual surplus well above the Tasmanian Working Party's predictions. As an indication of its extent, the State Premier recently announced that one-half of the 1980 graduates from the studentship scheme, could not be offered employment for the following year. Although since rescinded, the statement suggests a surplus of some 300 primary and secondary teachers for 1981⁴⁵, without considering unemployed teachers from previous years.

Notwithstanding the above, shortages of subject specialists in the secondary sector still exist⁴⁶. This seems most true of Music and Commerce teachers, and to a lesser extent, Home Economics, Manual Arts and Art teachers. Mathematics and Science teachers, although approaching a state of balance, were still in slight shortage in 1980. At a subject specialist level, the most dominant feature of the present supply and demand situation is the surplus of English and Social Science teachers - which has been described by the Department's officers as the only, potentially 'uncontrollable' element in the supply-demand equation.

6 THE SECONDARY CURRICULA

(A) Background.

The Schools Board of Tasmania was constituted in 1944 to devise and govern new systems of awarding school certificates at junior secondary level. From 1946 onwards, the Board accordingly supervised a four-year course of education leading to the Schools Board Certificate, later to be replaced by the Schools Certificate. In 1966 the Board was reconstituted to become the sole examining and certifying body at both junior and senior secondary level in the State. Soon thereafter, the matriculation examinations previously conducted by the University of Tasmania, were replaced by the Higher Schools Certificate examinations.

Until most recently, the Board has had great influence both upon the type of subjects offered by schools, and upon the content of these subjects. Through a series of committees, each responsible for a particular subject area, it has established what are effectively syllabus guidelines for each subject - with which a school must comply if its pupils are to be eligible for accreditation in that subject. Schools have for many years been free to introduce their own school-based curricula, either for established disciplines or for new subjects. However, because the merit of a certificate is often judged by the community generally, and by prospective employers in particular, in terms of the number and type of subjects passed, the spread of school-based curricula has been limited.

The junior and senior secondary subjects governed by the Board 1978-1980, are listed in Appendices 3 and 4. Also shown is the system of subject classification used in the analyses undertaken in this report.

Although variations exist, the following curriculum structure is

common to many junior secondary schools and school sections.

For pupils in Grades 7 and 8:

English, Social Science, Mathematics, Science, Physical Education and often Music and Art as compulsory subjects;

and a choice between French, Manual Arts and Home Economics/Commercial subjects.

For pupils in Grades 9 and 10:

English, Social Science, Mathematics and Science (or some specific branch thereof) and Physical Education as compulsory subjects;

and some system of choice, usually reflecting an academic/non-academic streaming, between the following options: Art, Manual Arts, Home Economics, Commercial subjects, French, German, occasionally a further foreign language, extension courses in any of the five compulsory subjects and increasingly, a number of school-based subjects.

Typically, a junior pupil would study between seven and ten subjects per year.

At the senior level, usually four or five subjects are studied each year. There is a greater freedom to choose between all available options, with the choice often being determined by a student's future intentions: e.g. consequent attendance at a university will mean that the selected subjects will need to satisfy matriculation requirements, as well as any specific pre-requisites for the intended course of study.

The type and number of subjects offered by a school, are understandably prime determinants of specialist teacher needs. Accordingly, a subject teacher demand planning methodology will need to take one of the following stances:

- (i) to assume that there will be no significant changes in the secondary curricula in the projected period;
- (ii) to assume that future changes will be predictable and thus allowed for in the preparation of estimates;
- (iii) to develop a system of monitoring curriculum changes, to which the planning methodology could respond.

For as long as the Schools Board continues to govern secondary curricula, the likelihood of widespread changes seems low. Although the Board makes perhaps one or two revisions per year to the range of subjects under its supervision, the subjects concerned are invariably very minor in terms of enrolments. At the junior level over the past five years, for example, Japanese has been the only new subject approved and the four subjects discontinued during this period, have affected only a relative handful of pupils and teachers.

(B) Possible curriculum developments.

The Secondary Schools Report recommends that at a junior level, a school curriculum should consist of two components:

- (i) a core curriculum involving all pupils in all schools. The proposed six core areas were: language, mathematics, studies of the physical environment, studies of the social and cultural environments, and a consideration of problems of general concern to adolescents. In addition it was considered that all pupils should be involved in physical education;
- (ii) "provision should (also) be made for some students at some schools to choose areas of activity that have not been defined above. Especially in later years, students will benefit from, and be motivated by, studies which have an obvious relevance to their present or future lives. Sometimes such studies will be an addition to the core curriculum (e.g. shorthand, driver education) and sometimes ... an expansion ... (e.g. physics, geography, Tasmanian history, ornithology)"⁴⁷.

Several core areas as defined by the Committee, seem to be more or less covered by existing Schools Board subjects. However it was stressed that prevailing subject divisions were commonly to be discarded; and that the various activities and experiences be taught through integrated approaches, or through the study of major topics across subject boundaries. Core areas should concern not only all

pupils, but also all teachers.

In this reorganized curriculum structure, the Committee saw a continued, but less prescriptive role for the Schools Board or its equivalent. Although emphasizing the independent role that each school should take in curriculum decisions in the light of its own philosophy and resources, an explicit distinction was made between core and other areas.

"Within core areas, teacher or school-based initiatives lie primarily in teaching approaches ... and in adapting and tailoring materials to the individual needs of single students or groups of students. Outside the specified core areas, initiatives are open to teachers and schools in all aspects of curriculum development (including the creation of new courses)." ⁴⁸

The Committee recognized the need for some measure of curriculum stability, by recommending that the Schools Board - or rather, its suggested replacement, a Standing Committee consisting of Departmental and other representatives - continue to exercise central control over the basic core curriculum elements. This rejection of full school diversity was prompted by several factors both educational and administrative, including the difficulty of providing adequate, appropriate pre-service training if school curricula were to become totally fluid.

The series of curriculum-related recommendations made by the TEND Committee, represent a further step away from a central governing body.

"During the last ten years there has been a marked tendency to reduce the prescriptiveness of the central authority and to increase the school's responsibility for determining the curriculum. It is a tendency to be encouraged." ⁴⁹

In keeping with the general theme of school autonomy, it was also recommended that certification become a school responsibility.

A different situation was recommended at the senior level. Without impairing the right of colleges to develop and assess their own courses, some of the present uses of the Higher School Certificate were acknowledged as of value. The Committee gave to the Schools Board, the somewhat unenviable role of establishing a certification system which would maintain the flexibility of college programs and not restrict the initiative of teachers, and at the same time would serve the traditional purposes of assessment.

Care must be taken not to exaggerate the impact of school-based curricula upon the spread of learning experiences. Teachers, and especially principals, as the successful products of an educational system, may not be all that keen to discard conventional curricula. Already a small number of Departmental schools, perhaps as a reaction to past educational experimentation, have re-stressed the traditional concerns of literacy and numeracy. Most markedly at senior level, it is likely that the the University of Tasmania's matriculation requirements will continue to figure prominently in curriculum decisions. Further, in many instances, it is probable that the effects of school-based curricula will be to change the balance and emphasis within existing subjects and disciplines, rather than to create totally new approaches.

Should curriculum developments occur along the general pathways recommended, however, it is virtually inevitable that there will be many changes in the skills and knowledge required of teachers. Accordingly, any supply and demand approach used in regard to the Department will, on a long-term basis, need to monitor emerging trends very closely.

FOOTNOTES

- ¹ Report of the District Schools Committee to the Minister for Education, The Future of District Schools in Tasmania, Education Department of Tasmania, Hobart, 1978.
- ² Since their establishment, these colleges have been variously termed 'matriculation', 'secondary' and most recently, 'community' colleges. For the purposes of the report, the initial nomenclature has been maintained.
- ³ Tasmania Education: Next Decade, (the TEND Report), Education Department of Tasmania, Hobart, 1978.
- ⁴ Based upon statistics held by the Department's Research Branch.
- ⁵ Review for the Education Department by the Committee on Secondary Education, Secondary Education in Tasmania, Education Department of Tasmania, Hobart, 1977.
- ⁶ Tasmania Education: Next Decade, p45.
- ⁷ Based upon statistics in: Education Department of Tasmania, Research Branch, Survey Report No. 30, 1979 revision.
- ⁸ See Section 4 of this chapter.
- ⁹ As explained in: Teacher Supply and Demand in Tasmania, 1980-1990.
- ¹⁰ Ibid.
- ¹¹ As detailed in Chapter 4, in reference to Table 4.15.

- ¹² Based upon information supplied by the Department's Personnel Office.
- ¹³ For example: Burkhardt, 'Characteristics of teacher turnover in primary and secondary schools';
Selby Smith, 'An economic approach to teacher loss and retention'.
- ¹⁴ Education Department of Tasmania, Research Branch, Teacher Education: Estimate of Required Recruitment to Departmental Studentships 1979-1987.
- ¹⁵ Nature of pre-service courses for secondary trainees, are detailed in: Education Department of Tasmania, Guide to Teacher Education, Tasmania Media Centre, Hobart, 1979.
- ¹⁶ Education Department of Tasmania, Studentship Selection Report, Studentship Office, Hobart. For each of the years 1974-1980.
- ¹⁷ See Table 4.8 in Chapter 4 of this report.
- ¹⁸ Education Department of Tasmania, Guide to Teacher Education, September 1973.
- ¹⁹ Education Department of Tasmania, Research Branch, Staffing Needs and Studentship Selection, September 1973.
- ²⁰ Education Department of Tasmania, Studentship Selection Report, 1974, p9.
- ²¹ Ibid.
- ²² Ibid., for each of the years 1974-1976.
- ²³ Based largely upon conversations with Departmental officers.

- 24 Based upon statistics in: Education Department of Tasmania, Studentship Selection Report. For each of the years, 1974-1980.
- 25 This finding has been confirmed in conversations with Departmental officers.
- 26 The UK Government for example, is to offer a scholarship worth about \$1200 a year on top of normal grants, to students prepared to train in shortage subjects in 1981. (As reported in 'The Australian', no. 4989, 13 August 1980, p9.
- 27 Such allocation is still made largely in the absence of precise knowledge of staffing needs - and is at least partly determined by the enrolment requirements of training institutions.
- 28 Based upon statistics in Table 5.0, in: Education Department of Tasmania, Education Department Report, Government Printer, Hobart. For each of the years, 1966-1979.
- 29 Education Department of Tasmania, Guide to Teacher Education, p3.
- 30 The following statistics were obtained from Tables 4.1 and 5.0 in: Education Department of Tasmania, Education Department Report. For each of the years, 1966-1979.
- 31 See Table 4, Education Department of Tasmania, Research Branch, Teacher Education: Estimate of Required Recruitment to Departmental Studentships 1979-1987.
- 32 Education Department of Tasmania, Research Branch, The Induction of Beginning Teachers in the Tasmanian Education System, 1979.
- 33 Consider for example, the Department's secondary schools staffing formulae.

- 34 Education Department of Tasmania, Research Branch, The Induction of Beginning Teachers in the Tasmanian Education System.
- 35 Ibid.
- 36 Secondary Education in Tasmania, p192.
- 37 Tasmania Education: Next Decade.
- 38 The development of regional administration has been detailed in: Education Department of Tasmania, Regionalisation in Tasmania 1976, Hobart, 1976.
- 39 'Apparent' only, because the unexpected decline in wastage, together with the Department's policy of employing all studentship graduates, has meant that at the beginning of 1980, most schools were staffed above quota.
- 40 See Teacher Supply and Demand in Tasmania, 1980-1990, p86.
- 41 Ibid.
- 42 The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985.
- 43 Teacher Supply and Demand in Tasmania, 1980-1990.
- 44 Based upon teacher resignation statistics, held by the Department's Research Branch.
- 45 Including teacher applicants from 'other' sources, as estimated in: Teacher Supply and Demand in Tasmania, 1980-1990.
- 46 According to conversations with Departmental officers.
- 47 Secondary Education in Tasmania.

⁴⁸ Ibid.

⁴⁹ Tasmania Education: Next Decade, pl3.

CHAPTER 3

RESEARCH DESIGN

1 AIM

Information derived from various sources pertaining to teachers in a sample of secondary schools in the Tasmanian State system, has been collected and analysed for the years 1978, 1979 and 1980. Details about the sample, the data sources used, the scope of the data collected and its analysis, are provided in the following sections of this chapter.

With regard to the collection and analysis of information, the report has a dual aim:

- (i) to develop a statistical basis and appropriate mechanisms to allow the current supply and demand model used by the Department to take a detailed account of the subject specialities of secondary school teachers;
- (ii) to assess the state of a select range of school and educational conditions, and where appropriate, to take into consideration in a supply and demand context, possible changes in these conditions.

(A) Supply and demand of subject specialists.

- (i) part-time teachers and full-time equivalence

There are various problems arising from the issue of part-time employment which may beset teacher planning. In order to assess their

likely significance in the Tasmanian situation, an early subsidiary aim within this general area, was to determine the frequency of part-time secondary teachers and to determine their full-time equivalence.

(ii) extent of subject specialisation

Subject specialisation in the secondary sector has been used in this report to refer to the practice of teachers being active year to year, commonly in one or two subjects only - usually as a result of training, experience and/or choice. Clearly, if this practice is not common to most schools, much of the purpose of the report is lost. (Tertiary institutions might also have some reason to revise their approach to teacher training course structures.)

Another early task was therefore, to identify the extent to which subject specialisation occurred in the selected schools and to determine whether any changes in this extent have occurred 1978-1980.

(iii) teacher supply and demand per subject

The methodology developed to fulfil the first general aim of the report, has been summarised in Figures 3.1 and 3.2.

Figure 3.1 dealing with demand estimates may be briefly outlined thus:

its starting point is the overall set of secondary teacher demand estimates for a given year, as provided by the Department's planning model. These estimates relate to all secondary personnel appointed under the provisions of the Education Act;

the second step is to quantify demand for each of the four categories of Education Act appointees. This is a relatively straightforward procedure, relying mainly upon the secondary schools staffing formulae, which effectively determine the required numbers of teacher-librarians, laboratory technicians, and college counsellors,

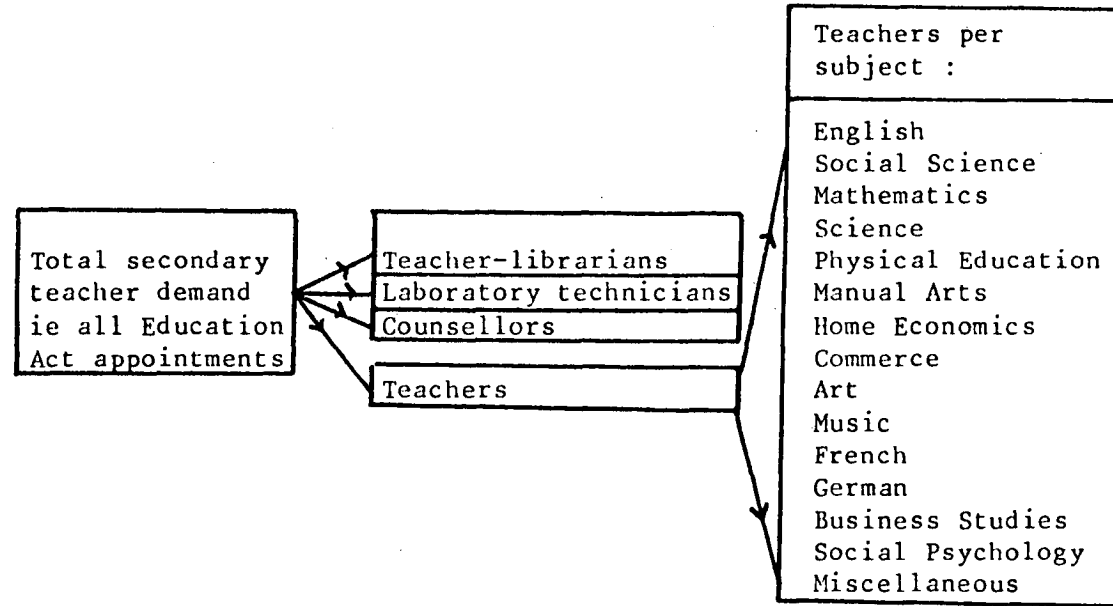


FIGURE 3.1: METHODOLOGY FOR ESTIMATING SECONDARY TEACHER DEMAND PER SUBJECT IN THE TASMANIAN DEPARTMENT OF EDUCATION.

for a given year. Teachers, in the classroom-related sense, remain as the fourth category of appointees, to be balanced against the overall estimates yielded by the Department's model;

and as a third step, classroom teacher demand estimates are refined into estimates per subject area. By a procedure to be later detailed, the secondary teaching force for each of the years 1978, 1979 and 1980, has been apportioned to each of the subject areas shown in the diagram: i.e. it has been determined that in full-time equivalent terms, X% of all teachers in a given year are English teachers, Y% are Home Economics teachers, and so on. These proportions form the basis of the projections yielded in the final step of the diagram, to produce full-time equivalent teacher demand estimates for each subject.

An example of Figure 3.1 at work for the year 1981, based upon statistics yielded by the Department's planning model and by the present exercise, is given in Figure 4.1 and may be outlined as follows:

Figure 3.2 concerns supply estimates per subject:

for a given year, the starting point is the size of the overall secondary staffing establishment (i.e. all Education Act appointees) of the preceding year;

in the same way as in Figure 3.1, the second step is to provide separate statistics for each of the four categories of personnel covered by the Education Act, pertaining to the preceding year;

thirdly, it is required to show total anticipated teacher loss rates for the year in question - a statistic that is already provided by the Department's model;

fourthly, it becomes necessary to refine this gross loss into loss per subject area. With the respective advantages and disadvantages discussed in a later section, two alternative methods to enable this refinement have been developed:

- the first being on the basis of actual full-time equivalent losses through resignation, for each subject over the years 1978

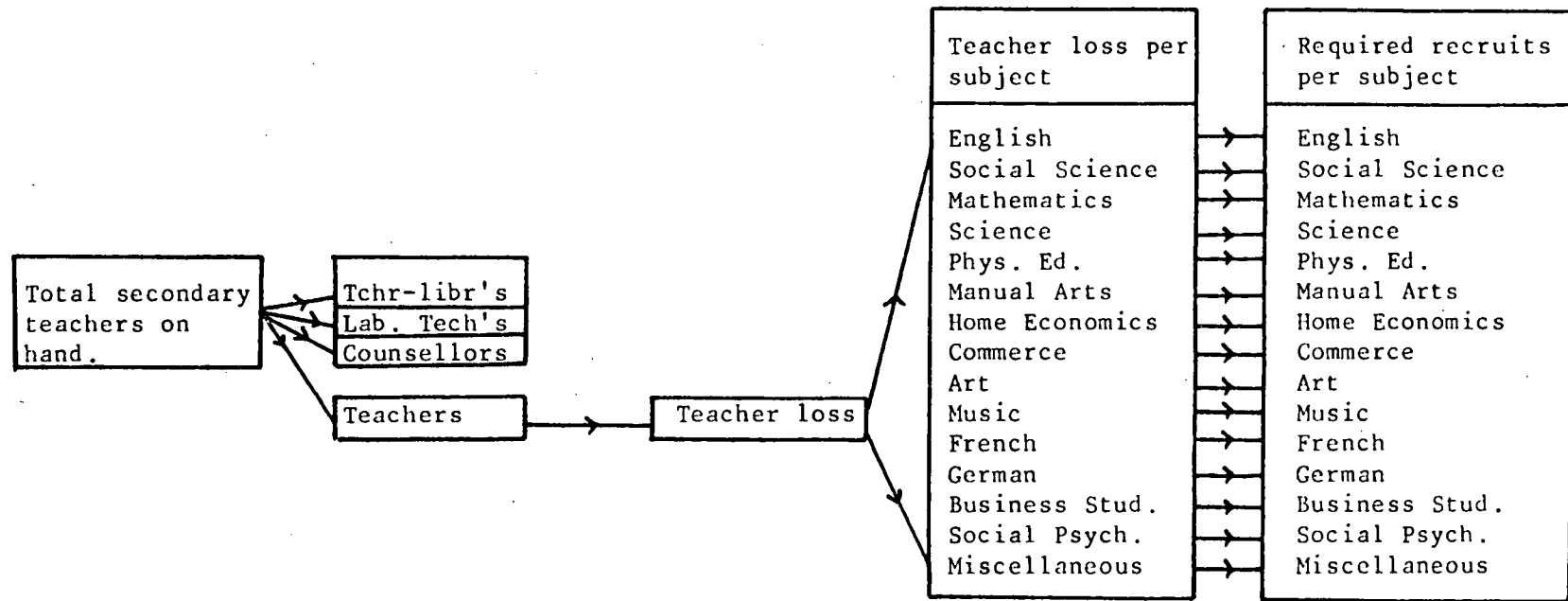


FIGURE 3.2: METHODOLOGY FOR ESTIMATING SECONDARY TEACHER SUPPLY PER SUBJECT IN THE TASMANIAN DEPARTMENT OF EDUCATION.

and 1979;

- and secondly, theoretical subject loss projections have been calculated, based upon the masculinity of teachers in each subject area. Recognizing that male teachers have a sizeably lower wastage rate than do female teachers, it follows that subjects with high masculinity rates would be expected to have lower wastage rates;

the fifth and final step in regard to Figure 3.2, is to determine the required full-time equivalent recruitment levels for each subject. These estimates are obtained thus:

- by analysing the teaching force of the previous year into teachers per subject area, as per Figure 3.1;
- from the loss rates per subject calculated above, it can be determined how many teachers per subject area will be continuing in service from the preceding year;
- by considering full-time equivalent teacher demand for each subject area for the year in question, again as per Figure 3.1, relative to the number of subject teachers on hand, the necessary full-time equivalent recruitment levels can then be determined.

An example of Figure 3.2 at work for the year 1981, based upon statistics yielded by the Department's planning model and by the present exercise, is given in Figure 4.2.

(iv) teacher recruitment

The final product derived from the above methodology are annual sets of recruitment projections, covering all major secondary subject areas. If only to test the plausibility of achieving these estimates, an analysis has also been made of recruitment patterns for the years 1978, 1979 and 1980, in order to provide an albeit limited, historical context.

Annual subject recruitment projections may be used by the Department's planning officers to determine for each year, appropriate

levels of pre-service studentship intake per field of specialisation - the assumption being that upon appointment to a school, the subjects taught will be appropriate to the nature of training. A further aim within a recruitment context, was to test this assumption.

(v) planning for subject specialisation

The consideration of secondary teachers as subject specialists, is not limited to an estimation of annual pre-service recruitment requirements. It was suggested in the introduction to this report that there is also the need to ensure that for each school year, the teaching specialities of a school's allocated staffing complement will be as appropriate as possible, to the school's specific curriculum offerings. Given the various forms of teacher movement that occur year to year, and given also the different criteria that may be used in assessing subject specialities, staffing allocation becomes a complex task.

The approaches used in the report to quantify the different types of subject specialists, have varied according to the different purposes for which the information was required. Numbers of subject specialists have been calculated, first, in full-time equivalent terms by apportioning each year's teaching force to the various subject areas according to reported loadings per subject. In other instances, numbers of specialists were calculated simply through a head-count of all teachers active in each subject. Numbers have also been determined through analysis of pre-service training specialities. (The three approaches are detailed later in the chapter.)

Additionally, in the Department's teacher planning, particularly in planning the allocation of subject specialists to the various secondary schools in the system, teachers are commonly considered in terms of the following fields of specialisation: English; English/Social Science; Social Science; Mathematics;

Mathematics/Science; Science; Physical Education; Manual Arts; Home Economics; Commerce; Art; Music; French; French/German; German; Business Studies; Social Psychology; and Miscellaneous.

It was a further aim therefore, to attempt some comparison of these different approaches, in order to facilitate the annual allocation of secondary teaching staff.

(B) Select school and educational conditions.

The second general aim of the report has required investigating the state of a range of select school and educational conditions:

- (i) to quantify these conditions as they existed over the years 1978-1980;
- (ii) to assess the impact of possible changes upon teacher supply and demand.

In many instances the investigations undertaken have been restricted to the high school sub-sample, because of the low teacher numbers in the other two types of secondary schools. Consequently, although high school teachers constitute some 75% of all secondary teachers, the results obtained from these analyses may not prove fully applicable to the total secondary system.

(i) pupil-teacher ratio and average class size

The use of the pupil-teacher ratio in the Tasmanian Department's planning model in determining teacher demand, is traditionally justified by the relationship claimed to exist between this variable and the class sizes in a school system.

The conceptual development of the pupil-teacher ratio intended that the relationship be a dual one¹:

first, given a constant teacher loading, the change in average

class size will proportionally match the change in the pupil-teacher ratio;

secondly, given a changing pupil-teacher ratio together with a constant teacher loading, the size of all classes will change at the same rate - i.e. the average class size will change at the same rate as, for example, the 95th percentile.

In view of the controversy that exists about its adequacy in this regard, the relationship between pupil-teacher ratio and class sizes in the Tasmanian system was analysed over the period 1978-1980. In so doing, it was also intended to indicate a means to allow teacher planners to move more freely between the two variables.

(ii) teacher loadings

Any change in the pupil-teacher ratio may have dual significance - there may be a consequent change in class sizes and/or there may be a change in teacher loadings. The converse is also true: holding class sizes constant, compliance with any demand for a reduction in teachers' classroom contact time will require some improvement in overall pupil-teacher ratios.

The assumptions concerning pupil-teacher ratio improvements used in the Department's planning model, are based upon the 1977 Staffing Agreement discussed in Chapter 2. The Agreement stipulated a series of annual expansions in the primary and secondary teaching forces, in order that select teacher loadings might be reduced without causing larger class sizes. Teacher loadings for the three years 1978-1980 were consequently examined to assess the extent to which the loading reductions underlying the Staffing Agreement had been met; and to assess the continued impact, the further achievement of loading reductions is likely to make upon teacher demand.

As mentioned, recent developments both within the Department and externally, have emphasized the desirability of induction procedures

for first-year teachers - a sum result of which would be reduced teacher loadings for first-year teachers and for senior staff acting in various training/advisory capacities.

The loadings of first-year teachers in the high school sub-sample were examined relative to the loadings of other base teachers, to assess possible implications for teacher demand.

(iii) teacher characteristics

The Department's teacher planning model, in projecting total teacher wastage statistics, assumes that retirements will remain a fairly minor component. In view of the decline in teacher wastage over recent years, it is feasible that the present teaching force is ageing at a sufficiently rapid pace to produce significant changes in impending retirement rates.

It is accordingly intended to investigate the age structure of the 1978 high school teaching force, and through an investigation of teacher recruitment, resignation and retirement patterns, to estimate expected retirement rates.

The decline in teacher wastage has also meant a present teaching force considerably more experienced than its past counterparts. Whatever implications this might have for the quality of teaching delivered in the Departmental system, it might also mean an increased incidence of long service leave entitlements - and thus, an increased need for qualified replacement staff. The 1978 high school teaching force was also analysed in terms of length of service. After allowing for the effects of teacher wastage and recruitment, projected incidence of long service leave entitlement was calculated.

(iv) size of schools

The size of a school as measured by its pupil enrolments, almost solely determines its staffing allocation, based upon the secondary school staffing formulae. (To a very limited extent, the allocation may be supplemented by teachers, either appointed on a part-time basis at the discretion of the Department's Personnel Office, or recruited directly by the principal using assorted funds at his disposal - these two factors being independent of school size.)

Given the relationship between size of school and staffing entitlement, an initial aim in this area was to investigate the extent to which staffing allocation policies produce different pupil-teacher conditions in schools of varying size.

The teacher demand estimates per subject, developed in this report, have been based upon the full-time equivalent teacher numbers per subject 1978-1980. The projection of the latter over future years in any teacher supply and demand planning exercise, may be invalidated:

if the proportions are affected by the size of schools - e.g. a bigger school with a possible wider range of curriculum options may have a different distribution of teachers across subjects, compared with a small school;

and, if school sizes over the period of the projections, undergo significant changes in size as recommended, for example, in the Department's recent TEND report.

Consequently, a further aim was to see if size of school relates to the proportions of teachers per subject area.

Size of school might also affect utilization of staff, particularly the extent to which subject specialisation might be observed. It has often been argued for example, that full specialisation is a luxury available only to larger schools and that

the smaller the school, the more likely the teacher will need to be a generalist, handling a wide range of subjects. This possibility also was investigated within the sub-sample of high schools.

(v) pupil-periods

Teacher loads to this point have been considered in terms of the average number of periods taught in a school cycle². Loadings may also be defined by the average number of pupil-periods taught per cycle - where pupil-periods are the product of pupil enrolments in a particular subject, and the number of periods in a school cycle devoted to the teaching of that subject.

The method of estimating the demand for subject teachers outlined in Figure 3.1, requires a reasonably high level of curriculum stability, particularly for long-term projections. The introduction of new subjects into school curricula, the deletion of existent subjects and changes in pupil exposure to subjects, are all factors which could invalidate the subject projections previously described.

The nature of teachers' pupil-period loadings across different subjects, and the data-bases underlying the calculation of such loadings, appear as a means to overcome, at least in part, these various problems. Additionally, the concept of pupil-periods may have other more specific uses in a planning context. For example, the Department's teacher planning model generally assumes pupil-teacher ratio improvements from year to year, but is unable to indicate which subject areas are most in need of these improvements. A consideration of desired or optimum pupil-period loadings across different subjects, would be a means to overcome this limitation.

Considering these and other uses, the final aim of the present study was to collect from the sub-sample of high schools for the years 1978-1980, the various data necessary to develop and illustrate the concept of pupil-period loadings as a planning device.

2 SAMPLE

Because of the relative smallness of the Tasmanian system, it was initially intended that the staffing situations of all twelve major district high schools and of all high schools and matriculation colleges, would be analysed for the years 1978, 1979 and 1980. However, it was found for a small number of schools that the Department was unable to provide full sets of principals' staffing and enrolment returns for all three years. In order to maintain maximum comparability of data over the period of analysis, these schools were consequently excluded.

The resultant number of schools in the sample, compared with the number of all secondary schools in the Tasmanian system, is provided in Table 3.1.

Teachers from the sample of schools consist of both part-time and full-time Education Act appointees, shown in principals' staffing returns to be on active duty in the secondary area at the time of the return's compilation - except for teacher-librarians, laboratory technicians and college counsellors.

Accordingly, the following personnel types have not been included:

- (i) staff absent through extended illness, long-service leave, secondment to service branches etc.;
- (ii) any service branch staff who may be based at a given school - unless shown as having some teaching duties, in which case they are included as part-time teachers;
- (iii) any personnel based at a school not appointed under the Education Act, e.g. teacher aides and classroom assistants.

Teacher numbers in the sample, compared with all secondary teachers in the Department, are also shown in Table 3.1.

TABLE 3.1: THE SAMPLE OF SECONDARY SCHOOLS COMPARED WITH THE TOTAL SECONDARY SYSTEM OF THE TASMANIAN DEPARTMENT OF EDUCATION, AT FEBRUARY 1978, 1979 AND 1980.

	1978			1979			1980		
	Distr	High	Matric	Distr	High	Matric	Distr	High	Matric
Schools:									
no. sample	9	28	5	9	28	5	9	28	5
no. system	25	33	7	25	33	7	25	34	7
%, sample	36	85	71	36	85	71	36	82	71
Teachers:									
no. sample	145	1287	208	151	1307	219	166	1319	249
no. system	288	1589	301	312	1621	309	343	1654	366
%, sample	50	81	69	48	81	71	48	80	68
Pupils:									
no. sample	1480	19055	2833	1520	18412	2913	1578	17513	2786
no. system	2664	22776	3906	2799	22045	4019	2936	21121	3776
%, sample	56	84	73	54	84	72	54	83	74

Source: 'Sample' statistics based upon principals' staffing and enrolment returns; 'System' statistics based upon Research Branch information.

Notes:

a. 'Teacher' statistics pertain only to those on active duty in schools at the beginning of each school year - and exclude teacher-librarians, laboratory technicians and college counsellors.

b. Estimates only, due to some teachers being shared between the primary and secondary sectors in district high schools.

Pupils are those reported in a principal's return, as enrolled in one or more subjects at that school.

Gross pupil enrolments, both in the sample of schools and in all secondary schools, are given in Table 3.1.

Despite the apparently arbitrary method of selection of schools, the overall sample may be considered to represent adequately the State secondary school situation in Tasmania. The total of 42 schools account for some 80% of all teachers and pupils for each of the years 1978, 1979 and 1980. Equivalent claims may also be made for the high school and matriculation college sub-samples.

Comparatively, the district high school sub-sample consists of a much smaller proportion of schools. Further, although comprising only around 40% of all district high schools, it accounts for 55-60% of teachers and pupils. These two aspects - small number of schools and over-representation of large schools - came about, because only the twelve major district high schools were of sufficient size to warrant detailed staffing and enrolment analysis.

In the total system 1978-1980, district high schools accounted for about 12% of all secondary teachers, high schools for 74%, and matriculation colleges for 14%. In the sample, however, district high schools accounted for about 9% of all teachers, high schools 78%, and matriculation colleges for 13%. Accordingly, the findings arising from the sample of schools discussed in the following chapter, have been generalised to pertain to the total secondary situation, only after giving appropriate weightings to each set of constituent sub-sample statistics.

3 DATA COLLECTION

(A) Some difficulties with data collection.

At the beginning of a school year, each secondary school principal is required to complete a series of returns detailing staffing numbers, teacher loads, subject offerings, and pupil enrolment levels, pertaining to his school. These returns for the years 1978, 1979 and 1980, for the sample of schools selected in the study, form the major data source.

Supplementary personnel information has been obtained from a wide number of additional staffing schedules, school returns, individual notices of appointment and of resignation, and on occasions from individual teachers' personnel files.

An early difficulty encountered in the data collection, relates to the extensive array of sources that needed to be consulted. Slight differences in the criteria for inclusion on a particular schedule or list, slightly varying methods of classifying a given variable, and compilation of schedules at different stages of a school year, have on occasions either prevented the full desired range of information being collected or have yielded divergent, even apparently incompatible results.

Computer-based handling of personnel information commenced in the Department only during 1979. To date, its development remains at a fairly limited level. Consequently this facility has been largely unavailable either as a means to validate data from other sources, or as a primary data source itself.

The problems arising from the assortment of data sources appear insignificant at a sample or sub-sample level. Even at the level of an individual school, they seem unlikely to have distorted or

concealed possible trends. However as they could be of limited influence upon specific measurements or statistics, questionable data reliability has been indicated wherever appropriate.

(B) Nature of data collection.

For the years 1978, 1979 and 1980, information has been collected from the following data sources, in regard to the secondary sector only.

(i) principals' staffing and enrolment returns

For each school - total number of periods per cycle.

For each high school - average number of periods allowed
for each subject in a school cycle.

The following subject classification was used throughout the report:

- | | |
|------------------------|------------------------|
| (1) English | (9) Art |
| (2) Social Science | (10) Music |
| (3) Mathematics | (11) French |
| (4) Science | (12) German |
| (5) Physical Education | (13) Business Studies |
| (6) Manual Arts | (14) Social Psychology |
| (7) Home Economics | (15) Miscellaneous |
| (8) Commerce | |

Further details of subject classification have been given in Appendices 3 and 4.

- For each teacher
- sex
 - number of periods taught per subject per school cycle
 - and thus, total number of periods taught per school cycle.

For each subject (high school only)

- number of pupils enrolled
- number of classes

(ii) other major data sources

Total secondary pupil numbers at the beginning of each school year for each school were derived from information held by the Department's Research Branch.

Numbers of part-time and full-time teachers, and full-time equivalence, per school were derived from information held by the Department's Research Branch, and on occasions from individual personnel files (as well as principals' returns).

Promotional status of teachers' in regard to substantive appointments only, were based upon information held by the Department's Personnel Branch, pertaining to August of each year.

Date of commencement of employment of each full-time teacher attached to a high school in 1978 was derived from information held by the Personnel Branch and from individual personnel files.

Birth date of each full-time teacher attached to a high school in 1978 was derived from individual teacher personnel files.

Sources of recruitment of new teachers 1978-1980 were determined from Studentship Office publications, Personnel Branch notices of appointment, and where needed, from individual personnel files.

Teacher resignations and retirements were derived from Personnel Branch resignation and retirement schedules.

4 DATA ANALYSIS

(A) Part-time teachers and full-time equivalence.

An initial task was to determine the numbers and loadings of part-time teachers in each sub-sample of schools for the years 1978, 1979 and 1980, and thus to express each teaching force in full-time equivalent terms.

Principals' staffing returns rarely indicated part-time or full-time status. However other staffing returns completed at the same time and returned to the Department's Research Branch showed for each school, the overall number of part-time staff and their estimated full-time equivalence. The latter forms were used for the high school and matriculation college sub-samples.

Because they did not differentiate between part-time primary and part-time secondary staff in district high schools, and because full-time staff shared between the primary and secondary sectors were regarded as part-time secondary staff, Research Branch forms proved inadequate for the district high sub-sample.

Instead, the following method was used. From each principal's staffing return, all teachers who had a loading less than the average loading of base-grade teachers for that school, were conditionally tagged as part-time. Individual personnel files were consulted to confirm or discount part-time status. Full-time equivalence was then calculated, by expressing each part-time teacher's loading as a ratio of the revised average loading of other base-grade teachers at the school.

The results of these analyses for all three sub-samples, are reported in the following chapter in Table 4.1.

(B) Subject specialisation.

Principals' staffing returns 1978-1980, were used to determine for each teacher in each school, the number of subjects taught. For each sub-sample, teachers were then grouped according to the number of subjects taught, with the results (expressed as percentages of each appropriate teaching force) shown in Table 4.2. The total sample percentages shown in the table have been derived by giving appropriate weights to each set of sub-sample statistics.

In order to measure the extent to which the types of subjects taught, varied over a three-year period, 137 teachers were randomly selected from the 1978 high school sub-sample. (The extensive difficulties involved in tracing all teachers over this period made a sampling approach the most feasible.) For each teacher, the types of subjects taught in 1978, and where appropriate in 1979 and 1980, were determined from principals' staffing returns. Results are given in Table 4.3.

(C) Teacher demand.

The approach to determining the numbers of teachers per subject in each school, outlined below, assumed that teacher loadings would remain essentially constant across all subjects: i.e. teachers in a particular subject would not be required to teach more or less periods, because for example, their class sizes or pupil-contacts were lower or higher than in other subjects.

To test this assumption, an examination was made of the teaching loads of base-grade teachers in the 1978 sub-sample of high schools, who were concerned with teaching exclusively any of the following subjects or subject-combinations: English, English/Social Science, Social Science, Mathematics, Mathematics/Science, Physical Education, Manual Arts, Home Economics, Commerce, Art, Music, and Miscellaneous.

Other subjects and subject-combinations were excluded because the teacher numbers concerned, were of insufficient size to yield meaningful results. Teachers in promotional positions were also excluded, because of their reduced teacher loadings.

The results of the analysis, standardised to represent a 30-period cycle, are presented in Appendix 5.

A similar examination was made of the 1978 matriculation college sub-sample. The relatively high proportion of teachers in promotional positions made it necessary to include all teachers below the level of vice-principal, to achieve adequate sample size. Also, the subjects and subject-combinations studied, varied somewhat from the high school analysis. The results standardized to represent a 25-period cycle, are presented in Appendix 6.

The small size of the district sub-sample prevented any equivalent analysis.

For each school for each of the three years under analysis, full-time equivalent teacher numbers per subject were then calculated as below:

- (i) from each principal's staffing return, the total number of periods taught by all teachers in a school cycle was calculated, as was the total number of all teachers. The average loading, or average number of periods taught, was then determined. This statistic was treated as one full-time equivalent loading;
- (ii) from the same source, the total number of periods taught in each subject was also calculated, and then expressed as a ratio of the overall full-time equivalent teacher loading. This figure was taken as the full-time equivalent number of teachers active in each subject.

Full-time equivalent teacher numbers per subject for each sub-sample, were derived by totalling the appropriate teacher numbers from each relevant school. Subject teacher numbers per sub-sample of

schools, are given in Appendix 7.

It was then possible to calculate for each sub-sample, the proportion of teachers in each subject. The proportion of teachers per subject for the total sample have been derived by totalling the weighted proportions of each sub-sample. The consequent figures therefore, may be directly applied to the overall secondary school system. The results are shown in Table 4.4.

A procedure similar to that described above, was used to determine separately, the full-time equivalent numbers of male and female teachers per subject. Again, male and female teacher numbers per subject for each sub-sample, were derived by totalling appropriate statistics from each constituent school³.

Subject teacher masculinity (i.e. number of male subject teachers : number of all subject teachers) was then calculated for each of the three sub-samples. Masculinity rates for the combined sample were derived by weighting sub-sample statistics, according to the distribution of each category of subject teacher across the three types of schools. Subject masculinity rates are presented in Appendix 9⁴.

(D) Teacher loss.

As the full number of 1980 resignations will not be known until well into 1981, a shortened data-base had to be established. For the two years 1978 and 1979, male and female teacher loss rates per subject were calculated by the following procedures:

- (i) all teachers from each school in the sample who resigned during a given year, were identified from Personnel Branch resignation schedules;
- (ii) principals' staffing returns were then used for high schools only, to determine for each resignee, the number of periods per

subject that had been taught prior to resignation. Each resignation was then expressed as a full-time equivalent loss per subject, by apportionment on the basis of previous teaching load: e.g. a teacher who had taught eight periods of English and twelve of Science, was represented as a full-time equivalent loss of 0.4 in English and 0.6 in Science;

(iii) in a very small number of instances, teachers who had resigned could not be traced to principals' staffing lists. This was usually because resignation had followed extended absence from normal duty - following maternity leave or long-term illness, etc. In such cases, apportionment was based upon the teaching load of the previous year, if known - otherwise, individual personnel files were used to determine in which subjects the teachers had been active, with equal apportionment to the appropriate areas being made.

Overall male and female resignation rates for the three sub-samples of schools 1978 and 1979, are shown in Table 4.5. Appendix 8 shows for the high school sub-sample only, full-time equivalent numbers of teachers resigning per subject 1978 and 1979, and the consequent loss rates per subject.

Total subject resignations were then expressed as proportions of the total resignation loss, for the high school sub-sample only. The statistics for 1978 and 1979 and for the combined two-year period, are shown in Table 4.6.

Resignations have in past years at a system-wide level, accounted for some 85% of all forms of teacher loss. It was assumed that the subject-related trends evident from the above analyses, would be equally pertinent to total teacher loss.

It has been mentioned that an alternative method of handling teacher loss has been developed, based upon the masculinity of teachers in each subject. A joint consideration of masculinity rates with overall male and female resignation rates, yielded theoretical

resignation rates per subject. A comparison of theoretical resignation numbers with actual resignations per subject for the 1978 and 1979 high school sub-samples, is given in Table 4.7.

(E) Teacher supply and demand per subject.

The data analysed to this point, allows the subject specialist supply and demand planning methodology outlined previously, to be applied.

The proportions of secondary teachers per subject 1978-1980 have been presented in Table 4.2. In conjunction with information from other sources, the 1980 statistics, as the most current index of subject teacher demand, were used to project specialist demand for the year 1981 - as shown in Figure 4.1.

The subject resignation trends over the two-year period 1978-1979 in Table 4.6, were used as the basis to subject supply requirements for 1981, as shown in Figure 4.2. (For reasons discussed in the following chapter, theoretical teacher resignation estimates based upon masculinity rates, were not used.)

(F) Teacher recruitment.

For the years 1978, 1979 and 1980, teachers from the sample of schools in their first year of employment were identified from Studentship Office publications, individual notices of appointment and where necessary, from individual personnel files. The same data sources were also used, to determine teacher numbers recruited from the studentship scheme and from all other sources. The results of this analysis are provided in Table 4.8.

For each first-year teacher recruited from the studentship

scheme, teaching load per subject was derived from principals' staffing returns. Each appointment was then expressed as a full-time equivalent gain, by apportionment to the appropriate subjects.

Recruitment numbers per subject for the total sample were obtained simply by totalling the appropriate full-time equivalent numbers for each school. (In both this and the previous instance, it was judged that the low numbers of appointments in the two smaller sub-samples, did not justify the use of weighted combinations to provide an overall picture.)

The results are presented in Table 4.9.

The investigation of the relationship between nature of pre-service training and type of subjects taught, was restricted to first-year teachers in the high school sub-sample, recruited from the Departmental studentship scheme in each of the years 1978-1980. This restriction was caused by the extreme difficulties in acquiring adequate details about the pre-service training of other teachers and recruits.

Teachers' training was analysed into major and minor subject areas, according to information provided by the Department's Studentship Office. Major subjects were those studied at least to the equivalent of third-year tertiary level. Minor subjects were those studied to the equivalent of second-year level. The subject loadings of first-year teachers were then examined, with each subject being judged appropriate/inappropriate to the teacher's course of training. These judgements were based upon existent personnel practices: graduates in Ancient Civilizations, History, Geography, or Asian Studies, were regarded as most suited to the Social Science area; graduates in Economics or Accountancy to either Business Studies or some areas of Commerce, etc.

The results are shown in Table 4.10.

(G) Planning for subject specialisation.

From principals' staffing returns, for the high school sub-sample only, total (head-count) numbers of all teachers involved in each subject were tallied, and compared with the full-time equivalent number of teachers per subject. The results are presented in Table 4.11.

Again using principals' returns, it was determined for each teacher in each secondary school, the particular combination of subjects taught: whether English only, English/Social Science only, English/Science only, etc. Teachers were then grouped within each sub-sample, according to these various subject-combinations - with the results for the total sample expressed as a percentage of each year's combined secondary teaching force, presented in Table 4.12. (Total sample statistics have again been derived by the weighted combination of sub-sample statistics.)

(H) Pupil-teacher ratio and average class size.

Principals' staffing returns and enrolment data were used to determine the pupil-teacher ratio of each high school, 1978-1980. Pupil-teacher ratios for the sub-sample were calculated by summing all pupils and all teachers in the constituent schools.

The number of classes held and the number of pupils in those classes, in each subject, in each high school, were determined from principals' enrolment returns, 1978-1980. It was then possible to calculate for each school, the overall average class size, by totalling the number of all classes and of all pupils in them. The average class size of the entire sub-sample was also determined in this way - i.e. by totalling all classes and all enrolments in all schools.

Mention has been made of the committee established in New South Wales in 1968, to investigate and advise on class sizes and teaching loads in government secondary schools⁵. In the course of its work the committee made use of a formula which served to calculate class size from a number of data. In a simplified form, the following formula was used:

$$\text{class size} = (E \times K) / (T \times M)$$

where: E was the number of pupils;

K, the number of time units of instruction received
by each pupil;

T, the number of teachers;

and, M, the average number of time units of instruction
given by each teacher.

As E/T corresponds to the pupil-teacher ratio, and as in a high school each pupil receives instruction in all periods of a school cycle, then the formula may be restated thus:

$$\text{class size} = \text{pupil-teacher ratio} / \text{average teacher loading}$$

(with 'teacher loading' being expressed as a proportion of the school cycle).

Principals' staffing returns were used to determine average teacher loadings per school. Teachers' involvement in sporting activities, assemblies, supervisory duties etc., was not considered. Each school's average teacher loading was then expressed as a proportion of the school cycle. Again, periods devoted to sports, assemblies, etc. were not included. The average teacher loading for the entire sub-sample was obtained by taking the mean of all schools' average loadings.

Using the above formula, it was possible to calculate for each

school and for the combined sub-sample, 'theoretical' average class sizes.

Pupil-teacher ratios and actual and theoretical average class sizes are shown in Table 4.13.

Each principal's enrolment return showed the number of pupils and the number of classes in each subject offered by his school. This information was used to calculate the range of average subject class sizes, per school.

Using the average subject class size as the basic unit, the distribution of class sizes for the high school sub-sample for each year 1978-1980, is shown in Table 4.14.

(I) Teacher loadings.

Principals' staffing returns did not consistently indicate whether teachers were in base positions or in various promotional positions. Accordingly, the data sources used, were Personnel Branch records at August of a given year, relating to substantial appointments only⁶. The four categories of promotional status were: 'principal', 'vice principal', 'senior master' and 'base teacher'. The number and proportion of teachers per category, in each sub-sample of schools 1978-1980, are given in Table 4.15.

For each promotional category, for the high school sub-sample only, principals' returns were used to determine both the teacher numbers involved and the total number of periods taught per category. The average loads of the three promotional categories and of base teachers, were then expressed as proportions of the school cycle. The results 1978-1980, are shown in Table 4.16.

First-year teachers in high schools only, were identified from

Studentship Office publications and from Personnel Branch notices of appointment, for each of the years 1978-1980. Principals' staffing returns were used to determine the average number of periods taught by first-year teachers in each school, which number was then expressed as a proportion of the number of periods in the school cycle. An equivalent analysis was made of all other teachers in base-grade positions in each school.

Statistics at the level of the combined sub-sample were derived by averaging the loadings of each category of teachers in constituent schools.

Comparisons of the loadings of first-year teachers with the loadings of other base-grade teachers, are provided in Table 4.17.

(J) Teacher characteristics.

As part of a previous exercise undertaken by the Department's Research Branch, the dates of birth of all Education Act appointees employed by the Department at August 1978, were obtained from individual personnel files. This information has been established as a computerized file and, for the purposes of this report, analysed to provide an age profile for the 1978 high school teaching force. The profile is presented in Figure 4.3.

Age is one determinant of teacher retirement: retirement is compulsory when a teacher is either 65 years of age (males), or 60 years, (females). Voluntary retirement up to five years before these ages, is also possible. Retirements may also be caused by illness - a factor likely to have a broad relationship with teacher age. To assist an interpretation of the data in Figure 4.3 as they relate to projected retirement rates, high school teacher retirements 1978-1980 were analysed in regard to stated cause and to age.

Following this analysis and allowing for other forms of teacher movement into and out of the system, high school teacher retirements for the next 25 years, were accordingly projected. The results are shown in Table 4.18, as average annual numbers over five-year intervals.

The dates of commencement of employment of all Education Act appointees employed at August 1978, derived from Personnel information, have also been established as a computerized file. The file has been analysed to show the length of service of all appointees attached to high schools at August 1978. The results are also shown in Figure 4.3.

After assessing the impact of likely future teacher movements into and out of the system, projected incidence of long service leave entitlements over the next 25 years, was calculated. The projections are contained in Table 4.19, again given in five-year intervals.

(K) Size of schools.

Total pupil enrolments per high school were obtained from Research Branch information, for each of the three years. Each year the high schools were then categorized according to size of enrolment - such that category Q1 represented the seven largest high schools and so on, until category Q4 contained the seven smallest schools.

In the following analyses, each category Q1-Q4 formed the basic unit of analysis. As an example, the 1978 pupil-teacher ratio was calculated by expressing the total number of all pupils enrolled in each category of schools, as the ratio of the total number of staff allocated to those schools. Statistics for the total sub-sample are the means of the category Q1-Q4 values: as such, there may be slight discrepancies with statistics reported in some other tables.

For each category of schools, for each year:

- (i) pupil-teacher ratios were determined;
- (ii) average teacher loadings were calculated;
- (iii) average class sizes were calculated.

A comparison of the four categories of schools across these three measurements, is provided in Table 4.20.

Using this same system of categorization, the proportions of teachers per subject area were determined for each category. A comparison of these proportions is made in Table 4.21.

Teachers in each of the four categories of schools were grouped according to the number of subjects taught. A comparison of the four categories on this measure of teacher specialisation, is provided in Table 4.22. (In this table only, sub-sample statistics were obtained by totalling the appropriate statistics for each individual school.)

(L) Pupil-periods.

Principals' enrolment returns were used to tally, for each high school for each of the years 1978-1980, the numbers of pupils enrolled in each subject. By totalling the appropriate numbers from each constituent school, total subject enrolments for the sub-sample were determined. These total subject numbers were then expressed as proportions of the combined number of all pupils (head-count) in all schools in the sub-sample. The results are given in Table 4.23.

Principals were also to complete at the beginning of each year, a form describing the school's timetable organization - from which data it would have been possible to determine the proportions of each school cycle devoted to each particular subject. Since timetable structures were not always finalised by the beginning of first term, the returns were frequently absent. The number of high school returns for 1978 was insufficient to warrant analysis. In 1979 the number of

returns had increased to cover just over half the schools in the sub-sample. In 1980, principals in 21 high schools returned the appropriate information.

For each of these schools in 1979 and 1980, the proportion of the school cycle devoted to each subject was calculated from the principal's return. Proportions were then averaged to provide a combined measure - the results of which, standardized to represent a 30-period cycle, are presented in Table 4.24.

Thus, given the pupil enrolment per subject and the number of periods per cycle for each subject, it was possible to calculate for each of the two years, the total numbers of pupil-periods per subject (standardized to represent a 30-period cycle). Pupil-periods per subject, also expressed as a ratio of full-time equivalent number of teachers per subject, are given in Table 4.25.

FOOTNOTES

- ¹ As reported in: Ahamud, 'Teachers in England and Wales'.
- ² The notion 'cycle' relates to each school's time-table structure, and refers to the series of periods in which pupils receive instruction in their chosen subjects. For example, many schools use a 30-period cycle, consisting of six periods per day per school week - which cycle is usually repeated throughout the school year.
- ³ Because male and female teachers' average loads differed slightly, due to the higher proportion of males in promotional positions, minor adjustments were necessary to maintain compatability with overall teacher numbers per subject.
- ⁴ Appendices 8 and 9 have been presented in order of their discussion in the following chapter, rather than in order of data collection and analysis.
- ⁵ Report of the Committee Appointed to Investigate and Advise on Class Sizes and Teaching Loads in Government Secondary Schools in New South Wales.
- ⁶ Given that virtually all substantive appointments to promotional positions are made by the beginning of each year, August information would be expected to be compatible with the situation at the time of prineipals' staffing returns' compilation.

CHAPTER 4

RESULTS

SECTION A

SUPPLY AND DEMAND OF SUBJECT SPECIALISTS

1 PART-TIME TEACHERS AND FULL-TIME EQUIVALENCE

The 1978, 1979 and 1980 secondary teaching forces have been analysed into their part-time and full-time components, with the results presented in Table 4.1.

A number of planning problems are customarily associated with the issue of part-time employment: e.g. the matching of teacher supply with estimated demand levels where only the latter has been calculated in full-time equivalent terms, logically requires that some measure of apparent over-supply should occur. The issue of casual relief teachers aside, it seems from Table 4.1 - most markedly for the high school sample and thus for three-quarters of all secondary teachers - that these various problems are very limited in the Tasmanian situation: e.g. the 40 to 50 part-time high school teachers per year restrict the need to 'over-supply' to a level equivalent to less than 3% of total annual supply.

To a lesser extent, for 1978 and 1979, the same may be said of the matriculation sub-sample. During these years, only some 5% of teachers were part-time.

TABLE 4.1: ESTIMATED FULL-TIME EQUIVALENCE OF THE TEACHING FORCE IN THE SAMPLE OF SECONDARY SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Teachers:	Type of school								
	1978			1979			1980		
	Distr High Matr			Distr High Matr			Distr High Matr		
Total no.	145	1287	208	151	1307	219	166	1319	249
No. f/time	117	1244	198	126	1269	207	122	1272	211
No. p/time	28	43	10	25	38	12	44	47	38
%, p/time	19.3	3.3	4.8	16.6	2.9	5.5	26.5	3.6	15.3
P/t loading	0.53	0.35	0.37	0.56	0.21	0.35	0.61	0.24	0.4
Total no.	145	1287	208	151	1307	219	166	1319	249
Fte no.	132	1259	202	140	1277	211	149	1283	226
%, fte	91.0	97.8	97.1	92.7	97.7	96.3	89.8	97.3	90.8

Source: based upon principals' staffing returns, Research Branch information and upon individual personnel files.

In 1980 however, the proportion had increased to 15%. The increase was due largely to two specific colleges, where the part-time staff component rose to 15% and 25%. This development may have been a means to cope with the increasing diversification of curriculum offerings arising from the transition to a community college - and may well become characteristic of other colleges in the immediate future.

A different situation exists for the district high sub-sample, where the proportion of part-time staff was consistently above 15% for all three years. The higher proportions may be readily explained by the following factors:

- (i) recruitment difficulties particularly in the more isolated areas mean a reliance upon qualified local people, who frequently are available to serve only on a part-time basis;
- (ii) the relatively small pupil enrolments per subject which often means that only a part-time subject specialist is required;
- (iii) the practice of sharing teachers between the primary and secondary sectors.

The latter factor was most pertinent in 1980, when noticeably higher numbers of teachers in almost all district high schools were active in both the primary and secondary sectors. This feature may be directly attributed to a compliance with the TEND Committee recommendation that staffing take a 'whole-school' approach, and that all teachers be used wherever it may be appropriate, throughout the school¹.

Although, at the level of the total secondary system, the significance of this high incidence of part-time staff is considerably lessened, several of the following comparisons of district high staff with their counterparts in high schools and matriculation colleges, require this factor to be taken into consideration. Consequently in all the following tables unless otherwise indicated, district high school staff totals only are reported in full-time equivalent terms. High school and matriculation staff totals represent actual

head-counts of all teachers listed in principals' returns.

Given the Department's recent decision to offer permanent part-time teaching positions, and in view of the points discussed above, it is judged likely that planning will increasingly need to consider part-time staff in calculations.

2 EXTENT OF SUBJECT SPECIALISATION

Subject specialisation as it customarily applies to secondary teachers, has been functionally defined thus: the tendency for teachers to be active commonly in one or two subjects only, and for those subjects to be largely unchanged year to year. Before developing a methodology aimed at dealing with subject specialisation in a supply and demand context, there is the logical need to demonstrate that the notion is indeed practised in secondary schools in the Tasmanian Department of Education.

(A) Number of subjects taught.

Whether subject specialisation is observed in the staffing policies of Departmental secondary schools, may be initially indicated by considering the number of subjects taught by each teacher in a school year. The results of an analysis of the loads of around 1700 teachers per year, for the period 1978-1980 for each of the three sub-samples of secondary schools and for the combined sample, are shown in Table 4.2.

In interpreting these results it must be noted that the method of subject classification used, produced a number of composite subject categories. Although a teacher may appear to be active in one subject only, within that subject framework he may be concerned with a number of quite disparate curricula. A teacher at a matriculation college classified as a Science specialist may in practice be teaching in any or even all of the following options - Physics, Chemistry, Geology, Biology and/or Environmental Studies. In high and district high schools, a Manual Arts teacher for example may be teaching Woodwork, Metalwork, Technical Drawing and Technology.

(This system of subject classification has been used because it

TABLE 4.2: PROPORTIONS OF TEACHERS PER NUMBER OF SUBJECTS TAUGHT IN THE SAMPLE OF SECONDARY SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Subjects taught	Proportions of teachers											
	1978				1979				1980			
	Distr	High	Matric	Total	Distr	High	Matric	Total	Distr	High	Matric	Total
0 Subjects	4.1	0.9	4.3	1.8	3.3	0.5	1.8	1.1	3.0	0.6	1.6	1.1
1 Subject	35.2	47.4	71.6	49.1	37.1	44.5	76.7	48.0	41.0	42.7	77.9	47.4
2 Subjects	44.1	40.1	21.6	38.1	43.7	40.1	19.2	37.7	36.1	39.8	19.7	36.5
3 Subjects	14.5	9.9	2.4	9.5	14.6	13.7	2.3	12.2	18.1	13.8	0.8	12.6
4 Subjects	2.1	1.5	0.0	1.4	1.3	1.1	0.0	1.0	1.2	2.9	0.0	2.3
4+ Subjects	0.0	0.2	0.0	0.1	0.0	0.1	0.0	0.1	0.6	0.2	0.0	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: based upon principals' annual staffing returns.

Notes:

a. 'Total' percentages derived by weighting the constituent sub-sample proportions.

b. Any discrepancy between totals and constituent scores due to rounding.

most accurately reflects the subject categories used by Departmental officers in their planning activities.)

It may be seen from Table 4.2 that on this specific measure, subject specialisation was widely spread across all types of secondary schools. For the total sample in each of the years under analysis: around 50% of all teachers taught a maximum of one subject only; slightly more than 35% were active in two subjects only; and almost all remaining teachers were active in a maximum of three subjects.

Although exact statistics were not compiled, teacher loadings suggested that of the 15% or so of teachers active in three or more subjects, there was usually only a limited involvement in the third subject. Typically, the subject was a Miscellaneous option, occupying two periods in the school cycle.

Number of subjects taught was found to vary across subjects. Taking the 1980 set of high school statistics as an example, it was found that although specialists in one subject only were drawn from all subject areas, they were proportionally less evident in the English, Social Science, Mathematics and Science categories, where the proportion of one-subject specialists ranged between 10-20% of teachers per subject. One-subject specialists were most evident in Physical Education, Manual Arts, Home Economics, Commerce, Art and Music, where the proportions ranged between 40-65%. Had this analysis excluded any teaching activity in Miscellaneous options, the above differences would have been stronger.

Number of subjects taught was found also to vary across type of school. In the light of the frequently-voiced proposition that the smaller the school, the more reduced the extent of subject specialisation, it is of special interest to compare the district high and high school sub-samples. In 1978 for example, 17% of district high staff taught in three or more subjects, compared with 12% of high school staff - lending early support to the above proposition. (Had

the greater incidence of part-time staff in the district sub-sample been considered, the differences again, would have been more noticeable.)

The issue of school size and consequent ramifications for teacher planning are discussed more fully in a later section of the report.

Matriculation college teachers were most likely to be involved with one subject only - 72% in 1978 compared with a sample level of 49%; 77% in 1979 compared with 48%; and 78% in 1980, compared with a sample level of 47%.

It appears that number of subjects taught also varies, although to a much reduced degree, across the three years of analysis. By 1980, 15% of all teachers had a teaching load spread across three or more subjects, compared with 11% in 1978. Some of this increase was attributable to developments in the 1979 high school sub-sample, arising from the increased number of staff who, in addition to the more customary subjects, came to teach Miscellaneous options. The further increase in the number of teachers active in more than two subjects for 1979-1980, is not so readily explained - and may be taken as a tentative indicator of possible imbalance in the supply and demand of various subject specialists.

(B) Constancy of subjects taught.

A sub-group of 137 teachers was randomly drawn from the 1978 high school sub-sample, to test the extent to which teachers acquired new subject commitments year to year. Select characteristics of this sub-group were initially compared with those of the total sub-sample, to indicate representativeness. The results, which suggest an acceptable level in this regard, are briefly listed below:

(i) sex - 58% of the sub-group were males, compared with 56% for the total sub-sample;

(ii) range of schools - all 28 high schools were represented in the sub-group;

(iii) number of subjects taught - in 1978, 52% of teachers in the sub-group taught in one subject only, 37% in two subjects only, 9% in three subjects and 1% in more than three - compared with 47%, 40%, 10%, and 2%, respectively, for the total sub-sample.

It was found that in attempting to trace the 137 teachers across the three years, small numbers each year were lost within the system. Teachers lost included those transferred to other schools outside the sub-sample; those on extended absence from normal duty by the beginning of the following year; resignations; and retirements. As a result, for each of the periods 1978-1979 and 1979-1980, the sub-group mortality rate was around 13%.

Table 4.3 shows the extent to which teachers' subject involvement varied 1978-1979 and 1979-1980.

The table shows that some limited acquisition of new subjects occurred year to year. For 1978-1979, 29% of teachers were active in subjects other than those in which they had taught the previous year; for 1979-1980, this proportion had dropped to 19%.

New subject commitments were however, very restricted. In 1979, 35 teachers taught new subjects, to the extent of an average six periods per 30-period cycle. At the level of the whole sub-group, this meant that an average 1.8 periods in new subjects in a 30-period cycle had been acquired. A similar situation occurred in 1980: the 20 teachers with new subject commitments, taught in those subjects for 7.5 periods per cycle - meaning for the whole group, an average of 1.5 periods.

These figures are further lessened in significance if it is considered that well over one-half of new commitments arose in regard to Miscellaneous curriculum options, some of which could have been an extension of teachers' usual subject areas.

TABLE 4.3: CONSTANCY OF SUBJECTS TAUGHT BY
A RANDOMLY-SELECTED GROUP OF HIGH SCHOOL
TEACHERS IN THE TASMANIAN DEPARTMENT OF
EDUCATION, 1978-1980.

Subject constancy	1978-1979		1979-1980	
	no.	%	no.	%
Teachers with no new subjects	84	70.6	84	80.8
Teachers with one or more new subjects	35	29.4	20	19.2
Total	119	100.0	104	100.0

Source: based upon principals' annual staffing returns.

3 TEACHER DEMAND

The previous two tables have established that in the allocation of teaching duties within the Department's secondary schools, the notion of subject specialisation is recognized:

- (i) first, by limiting most teachers' involvement to a maximum of two subjects in a given year;
- (ii) secondly, by allowing most teachers to remain within their specific subjects over a course of years.

This finding has been taken to constitute a major practical justification of developing a systematic approach to planning teacher supply and demand estimates per subject.

(A) Teacher loadings across different subject areas.

The methodology developed to estimate subject specialist demand, requires that the loadings of teachers remain essentially constant across all subjects. The results of an examination of the loads of base-grade teachers in all major subject areas in the 1978 high school sub-sample, are presented in Appendix 5.

The examination involved 639 teachers from all 28 high schools, representing 65% of all base-grade teachers and 50% of all teachers in the 1978 sub-sample. Although there occurred variations within individual schools, the small teacher numbers involved often made the differences of dubious validity. For the total sub-sample a very stable situation emerged, in full compliance with the initial requirement. All subjects or subject-combinations yielded an average teacher loading within 0.5 periods of the overall average of 22.4 periods - except for Science with an average of 23.2 and Miscellaneous, 24.1 periods. Considering the small teacher numbers in these two instances (twenty-three and eight respectively), the two instances seem of minimal significance.

An equivalent set of results obtained from the 1978 matriculation sub-sample, are presented in Appendix 6.

Although the 134 teachers so analysed represented two-thirds of the total sub-sample, teacher numbers per subject or subject-combination were occasionally quite small, thereby producing results liable to distortion. Despite this, an acceptably constant situation was again apparent. Eight of the thirteen subjects produced average loadings within 0.5 periods of the overall average of 14.3, with a further two subjects being within 1.0 periods. The remaining two subjects, although varying by up to four periods from the central statistic, together accounted for only seven teachers.

The small size of the district high sub-sample prevented any equivalent analysis.

(B) Teacher numbers and proportions per subject area.

Over 1600 teachers for each of the years 1978-1980 were apportioned to subject areas according to the nature of their teaching load. The consequent full-time equivalent numbers of teachers per subject in the three sub-samples of schools 1978-1980, are presented in Appendix 7.

Table 4.4, based upon the statistics in this appendix, shows for the combined sample of schools, teachers per subject as a proportion of all teachers in each of the years under analysis.

As may be seen, the four traditional core subjects - English, Social Science, Mathematics and Science - together account for around 50% of all secondary teachers. The technical subjects - Manual Arts, Home Economics, Commerce - comprise a further 20%, with the remainder being shared amongst the minor subjects.

TABLE 4.4: FULL-TIME EQUIVALENT TEACHER NUMBERS PER SUBJECT AS A PROPORTION OF ALL TEACHERS IN THE SAMPLE OF SECONDARY SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Subjects	Teachers (%)		
	1978	1979	1980
English	14.5	14.9	14.8
Social Science	11.2	10.9	10.9
Mathematics	12.4	12.2	11.8
Science	13.1	13.0	12.9
Physical Education	5.7	5.8	6.0
Manual Arts	10.5	10.5	9.9
Home Economics	7.0	6.8	7.0
Commerce	4.6	4.5	4.3
Art	6.2	6.1	5.9
Music	3.6	3.5	3.7
French	2.5	2.1	2.2
German	1.0	0.8	0.9
Business Studies	0.7	0.7	0.7
Social Psychology	1.1	0.8	1.0
Miscellaneous	5.8	7.5	8.0
Total	100.0	100.0	100.0

Source: based upon principals' annual staffing returns.

Notes:

a.Any discrepancies between totals and constituent scores due to rounding.

It is stressed that the analysis in Table 4.4 represents the actual situation 1978-1980 - and does not necessarily represent the profile which might have been desired by school principals and planning officers. Had there been a greater availability of Music and Commerce teachers, for example, there might also have been more teaching periods in these subjects. Accordingly, there would have been some shift in the full-time equivalent numbers of teachers in Commerce and Music, and to a lesser extent, in other subject categories.

Discussions with officers of the Department indicate that generally, the number of teaching periods for each subject are determined independently of the number of available specialists: should a staffing shortfall occur, it is usually necessary for other teachers to step beyond their specialities. However it is judged that limited exceptions to this would occur, with some curriculum options being either ^{replaced by} ~~lapsed~~ or curtailed in the absence of adequate numbers of suitably qualified or experienced staff.

The distribution of teachers across subjects was extremely stable over this three-year period, a finding of obvious importance to the preparation of teacher demand estimates. Despite the small teacher numbers involved in some instances, the proportions of teachers in all subject areas bar one, for the total sample were within one-half of 1% of the previous year's levels. A divergence of this magnitude is equivalent to about eight teachers.

The one significant exception to this stability was the sizeable growth of teacher numbers in the Miscellaneous category, where sample numbers increased from 94 in 1978 to 129 one year later, meaning for the total sample, a proportional growth from 5.8% to 7.5%.

This expansion which occurred within the high school sub-sample, may be largely attributed to the increased provision of remedial specialists attached directly to these schools during 1979, and also

to the increased tendency to supplement traditional subjects with a small range of experimental, often composite subjects. In regard to these latter two aspects: during 1978 only eight high schools had any number of Miscellaneous teachers; by 1979 the number had doubled to sixteen schools

Whether this category of teachers will continue to expand, remains open to question. Miscellaneous teacher numbers have proportionally grown only very slightly 1979-1980 - the 0.5% increase being due almost exclusively to developments in the college sector. On one hand, it is considered likely that as these institutions complete the transition to community colleges, the incidence of Miscellaneous teachers will continue to grow. On the other hand, the stability of the Miscellaneous category in the high school sub-sample 1979-1980, suggests that the previous extent of growth might be a 'one-off' phenomenon.

Comparable levels of stability in the distribution of teachers across subject categories were usually found for each sub-sample. Generally, this was least true for the matriculation colleges - where changes were most evident in the larger subjects, and thus cannot be attributed to possible distortions arising from small teacher numbers. The most probable explanation again relates to the community college aspect, whereby emphasis is swinging from providing predominantly a preparation for further tertiary studies, to establishing a more general educational service. It is inevitable that this transition is causing curricula changes - presently on a limited scale, but likely to become more marked over the next few years.

4 TEACHER LOSS

(A) Overall resignation numbers and rates.

The numbers of male and female resignees per type of school in the sample during 1978 and 1979, are shown in Table 4.5 - as are the various resignation rates, expressed as a percentage of each relevant teaching force.

At the combined sample level, it may be seen that the 1978 resignation rates were for males, 3.5%, for females, 11.8%. In 1979 these rates dropped to 3.0% and 7.7%, respectively. As the resignation percentages pertain only to the teaching force on active duty for each year, and thus exclude various teacher categories, the resignation rates cited above are consequently slightly inflated.

Bearing this qualification in mind, the sample's resignation rates compare closely with the rates derived from the total secondary system - which in 1978 were for males, 3.1% and for females, 10.6%. In 1979, the sample's rates were 2.2% and 6.5%, respectively.

The 1978 and 1979 resignations clearly show a continuation of the fall in teacher wastage remarked upon in Chapter 2. The 1979 resignation rate is only some two-thirds that of the previous year - with the extent of fall being greater for female teachers. The 1979 rate (overall, 5% for the sub-sample, 4% for the whole secondary system) is certainly at odds with the Department's most recent planning projections, which put future secondary resignations at 8%.

The different resignation rates from each sub-sample of schools provide a further point of interest. As a very general rule, district high school staff are younger, and less experienced both as teachers, and as teachers in a given school. The high proportion of resignations for this sub-sample, together with the Department's heavy

TABLE 4.5: RESIGNATION RATES OF TEACHERS IN THE SAMPLE OF SECONDARY SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978 AND 1979.

Teachers		Resignations							
		1978				1979			
		Distr	High	Matr	Total	Distr	High	Matr	Total
Number:									
	male	2	29	3	34	4	19	5	28
	female	11	66	6	83	12	36	3	51
	total	13	95	9	117	16	55	8	79
Percent:									
	male	2.5	4.0	2.2	3.5	4.5	2.6	3.5	3.0
	female	16.7	11.6	8.2	11.8	19.0	6.2	4.0	7.7
	total	9.0	7.4	4.3	7.2	10.6	4.2	3.7	5.0

Source: based upon Personnel Office resignation schedules, 1978 and 1979.

Notes:

a.As a proportion of the sum number of teachers shown in principals' annual staffing returns, as active in schools at the beginning of each school year.

reliance upon the studentship scheme to staff, especially, schools in outlying areas, lends support to this generalisation. Granted the danger in generalising from such a limited data-base, it seems that the high resignation pattern returned by this sub-sample is capable of holding up against the overall fall at a system level - there being in fact, a slight increase in district high resignations 1978-1979.

The consequences of the low teacher loss from matriculation colleges include an older, more experienced teaching staff, who by occupying a proportionally greater number of promotional positions, seem generally less prone to many of the causes thought to underly teacher resignations.

(B) Teacher loss per subject.

Appendix 8 shows for the high school sub-sample, full-time equivalent numbers of teachers lost through resignation per subject area 1978-1979, and the consequent resignation rates per subject.

For 1978 a total of 95 high school teachers resigned, with a further 55 resignations in 1979 - numbers judged so small when further analysed by subject category, as to render any extrapolation of subject-related trends of limited value. The numbers lost per subject were generally commensurate with the size of that subject's teaching force, and accordingly, many subject loss rates were in broad compliance with the overall resignation rates of 7.4% and 4.2% obtained in 1978 and 1979, respectively.

There were some noticeable exceptions to this, only some of which could be immediately discounted because of the small teacher numbers involved. The most puzzling exceptions were the categories of teachers who in 1978 had a loss rate either above or below 7.4%, and in the following year, reversed their stance in regard to the overall resignation rate. For example: in 1978, the loss rate of Music

teachers was 16.9%, more than double the overall rate; one year later, the Music loss rate was 2.1%, half the overall rate. To a lesser extent, this same pattern of reversal characterized English and Art teachers. Magnitude of change and/or numbers of teachers involved, whilst not totally excluding the possibility of chance distortions, do suggest more meaningful factors at work.

Table 4.6 shows high school teacher resignations per subject as a proportion of all resignations, for each of the years 1978 and 1979, and for the combined period.

Not unexpectedly, given the above discussion, the extent to which each subject accounted for the total number of resignations in a given year, varied considerably: e.g. in 1978, Science teachers accounted for 9.4% of all resignations; one year later, they accounted for 15.8%. For the combined two-year period however, a more stable set of statistics were obtained - at least in that they relate reasonably closely to the size of each subject's teaching force. Blatant exceptions occur, but a more extensive data-base could see these resolved.

(C) Masculinity rates per subject.

It has been suggested that subjects with greater proportions of male teachers to female teachers - i.e. higher masculinity rates - will have lower resignation levels than subjects with low masculinity.

Appendix 9 shows the masculinity rates per subject for the total sample of schools for 1978, 1979 and 1980. Assuming that there are no subject-specific factors which influence teacher turnover, subjects with the highest theoretical resignation levels (considered as a proportion of all teachers in that subject) would be Home Economics, Commerce, French, German and English, where the masculinity rate

TABLE 4.6: TEACHER RESIGNATIONS PER SUBJECT AS A PERCENTAGE OF ALL RESIGNATIONS IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978 AND 1979 AND FOR THE COMBINED PERIOD 1978-1979.

Subjects	Resignations (%)		
	1978	1979	1978-1979
English	19.2	12.9	16.9
Social Science	11.4	10.9	11.2
Mathematics	8.8	12.9	10.3
Science	9.4	15.8	11.7
Physical Education	7.5	10.5	8.6
Manual Arts	6.3	3.8	5.4
Home Economics	6.5	7.1	6.7
Commerce	4.3	1.8	3.4
Art	6.8	2.9	5.4
Music	9.8	2.2	7.0
French	2.2	2.4	2.3
German	1.2	2.2	1.5
Miscellaneous	6.6	14.5	9.5
Total	100.0	100.0	100.0

Source: based upon Personnel Office resignation schedules and principals' annual staffing returns.

Notes:

a. Any discrepancy between totals and constituent scores due to rounding.

ranges from 0% to 44.2%; and with the lowest resignation rates, Manual Arts, Science and Mathematics, masculinity 81.2% to 100%.

An initial test of the relevance of masculinity rates to teacher resignations may be made through reference to the data in Appendix 8. The results are negative. Despite the relative stability of masculinity rates across the three years, only the German and Manual Arts teacher resignations were consistently as would be expected; the resignation rates of Commerce teachers were consistently contrary to expectations.

(D) Theoretical and actual teacher resignations per subject.

Based on the masculinity rates reported in Appendix 9 and on the annual male and female resignation rates for high school teachers, 'theoretical' resignations per subject have been calculated for this sub-sample. Theoretical and actual losses per subject, expressed as proportions of all resignations, are compared in Table 4.7 for each of the years 1978 and 1979, and for the combined period 1978-1979.

The statistics in this table strongly suggest that if the subject masculinity rate is of relevance in estimating teacher resignations, then it needs to be considered in conjunction with other factors - factors which may or may not prove to be subject-specific. Of the thirteen subject teacher categories analysed in the table, theoretical resignations for the two-year period were within 10% of actual resignations in only four instances. Perhaps slight support for the concept may be drawn from the fact that in three of the four instances, the larger categories of teachers were involved - where it might be assumed, chance fluctuations year to year would be of less influence.

Other factors capable of differentially influencing subject loss levels may be easily discerned. Chances of re-entry to the teaching

TABLE 4.7: A COMPARISON OF ACTUAL AND 'THEORETICAL' TEACHER RESIGNATION NUMBERS PER SUBJECT IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978 and 1979 AND FOR THE COMBINED PERIOD 1978-1979.

Subjects	Number of resignations					
	1978		1979		1978-1979	
	Theor	Actual	Theor	Actual	Theor	Actual
English	16.4	18.2	9.2	7.1	25.6	25.3
Social Science	9.8	10.8	5.8	6.0	15.6	16.8
Mathematics	9.0	8.4	5.2	7.1	14.2	15.5
Science	8.0	8.9	4.8	8.7	12.8	17.6
Physical Education	6.5	7.1	3.6	5.8	10.1	12.9
Manual Arts	6.2	6.0	4.0	2.1	10.2	8.1
Home Economics	11.1	6.2	5.9	3.9	17.0	10.1
Commerce	7.0	4.1	3.6	1.0	10.6	5.1
Art	7.3	6.5	3.9	1.6	11.2	8.1
Music	4.2	9.3	2.6	1.2	6.8	10.5
French	3.1	2.1	1.5	1.3	4.6	3.4
German	1.4	1.1	0.7	1.2	2.1	2.3
Miscellaneous	5.0	6.3	4.2	8.0	9.2	14.3
Total	95.0	95.0	55.0	55.0	150.0	150.0

Source: based upon Personnel Office resignation schedules and principals' annual staffing returns.

Notes:

a. 'Theoretical' resignation numbers refer to expected resignations, based jointly upon the ratio of male to female teachers in each subject, and upon overall male and female teacher resignations.

b. Any discrepancy between totals and constituent scores due to rounding.

service, which vary according to subject specialities, could well affect a decision on whether to resign: hence perhaps the fall in the loss rates of English and Social Science teachers 1978-1979 (see Appendix 8). Prospects of alternative employment might be a second factor: hence perhaps the fairly constant level of Science teacher resignations and the low number of Art resignations. Some subjects may have higher proportions of part-time staff, which would tend to conceal the true amount of wastage: tentatively, a possible explanation for the low Home Economics and Commerce losses. Chance fluctuations year to year must also be considered.

Theoretical subject resignation estimates may prove of value in teacher planning, if extended to incorporate a wider range of possible factors and if trialled across a longer time-span than has been allowed for in this study. However in their present form, based solely upon individual subject masculinity rates, they have proven no more accurate at estimating subject losses than if the average resignation rate 1978-1979 had been applied equally to all subject categories over these two years.

5 TEACHER SUPPLY AND DEMAND PER SUBJECT

(A) Teacher demand per subject.

Estimated demand for secondary subject specialists in the Tasmanian Department of Education for the year 1981, is shown in Figure 4.1.

The Department's teacher planning model, as used in 1979, estimated that for 1981, a total of 2,280 secondary personnel appointed under the Education Act, will be required to staff all district high schools, high schools and matriculation colleges. According to the secondary schools staffing formula, some 167 appointees will be in non-teaching positions - i.e. teacher-librarian, laboratory technician or college counsellor positions.

The remaining 2,113 staff will be teaching in various subject areas - the proportion per subject having been determined by the methodology described in the previous chapter. The consequent number of teachers per subject shown in the diagram, based upon the 1980 set of statistics shown in Table 4.2, represents the full-time equivalent number of subject specialists required.

There are three main possibilities for error in the preparation of these estimates. In the first instance, total demand in a given year rests largely upon anticipated movements in staffing standards, reflected in pupil-teacher ratios used by the Department in its planning model². These ratios, which have been accepted without further query in the subject demand methodology, are considered to represent in the short term, the most significant single source of possible error.

Secondly, the division of Education Act appointees into

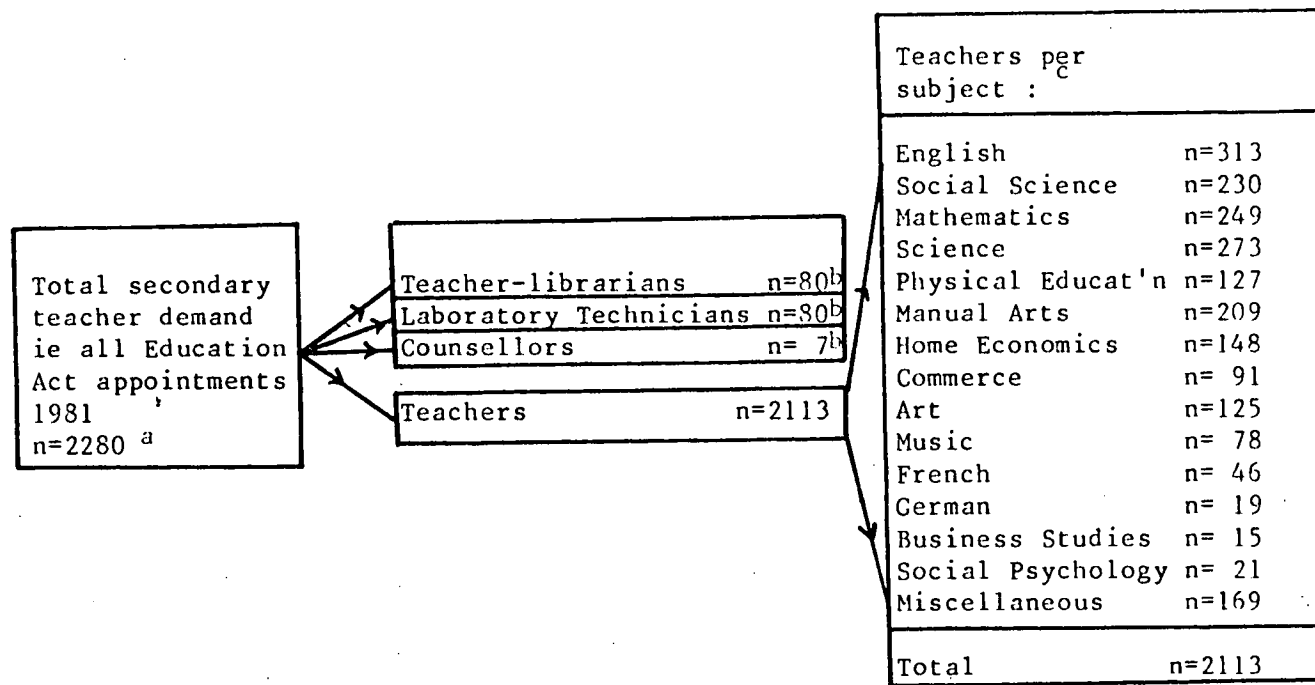


FIGURE 4.1: SECONDARY TEACHER DEMAND ESTIMATES PER SUBJECT IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1981.

Notes:

^aAs yielded by the 1979 application of the Department's teacher-planning model.

^bBased upon the 1979 secondary schools staffing formula and current enrolment levels.

^cBased upon the 1980 statistics shown in Table 4.2 of this report.

non-teaching and teaching categories for a given year, assumes a continuation of the current secondary schools staffing formula,³ and of 1980 school numbers and general enrolment sizes. Although both sets of conditions might change, variation is considered likely to be of minimal influence in the immediate future.

The third possible source of error concerns the projection of the 1980 subject teacher statistics across future years. The data gathered 1978-1980, suggest that on a short-term basis, any change in these proportions will be fairly minor - for all subjects bar one, a maximum of eight or so teachers per year. From a longer viewpoint, actual and impending changes in the Tasmanian secondary school system - including the probability of quite sweeping curricula changes at both junior and senior levels - require that this component be closely monitored and if appropriate, revised. (The shortcomings of this component, are more fully discussed in a later section of the report.)

It may be claimed with reasonable confidence that in the short term, the subject demand methodology described above, is unlikely to have significantly increased the error range associated with the more general demand estimates made by the Department's model. At the same time, additional information has been provided, which should assist in the regulation and control of teacher planning activities.

(B) Teacher supply per subject.

Estimated recruitment levels of secondary subject specialists in the Tasmanian Department of Education for the year 1981, are shown in Figure 4.2.

The Department's planning calculations presently project secondary teacher wastage at 8%⁴. Having analysed 1980 Education Act appointees into non-teaching and teaching categories, this wastage

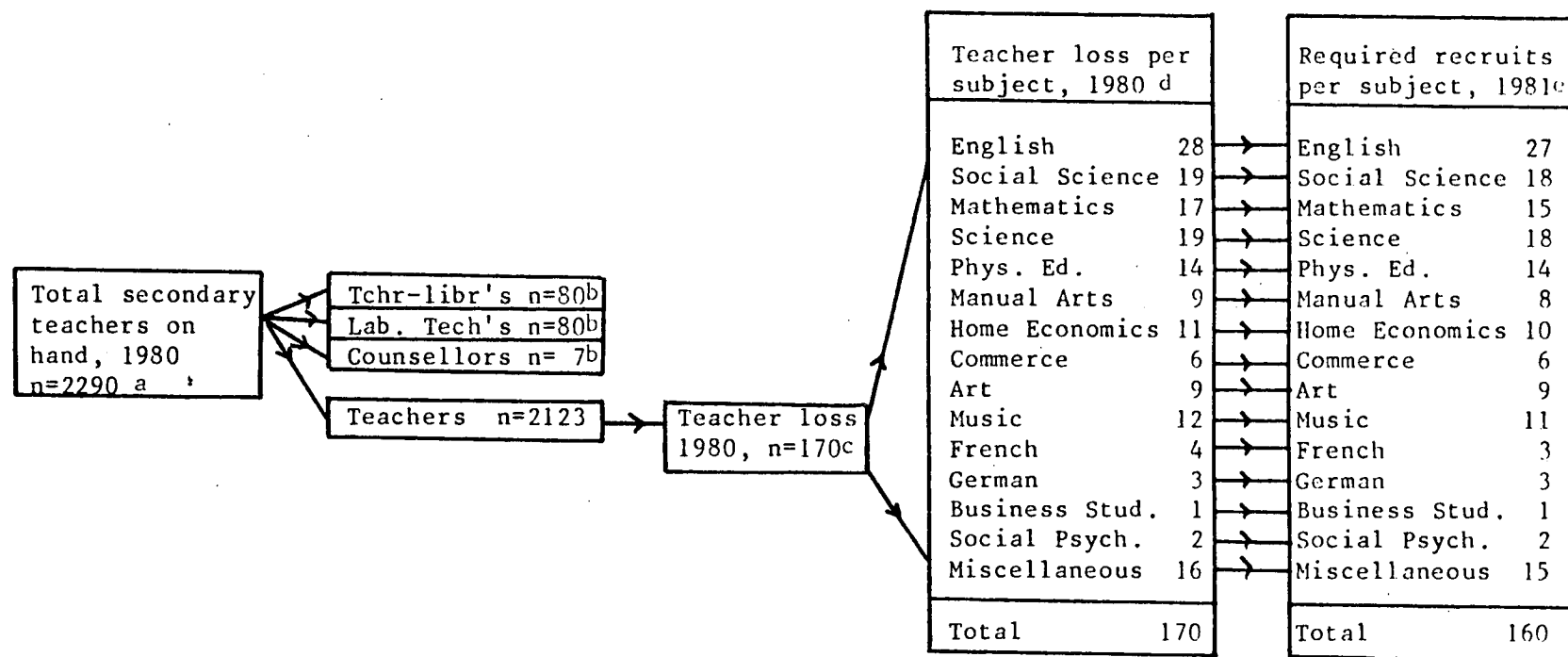


FIGURE 4.2: SECONDARY TEACHER SUPPLY ESTIMATES PER SUBJECT IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1981.

Notes:

- a. As estimated in the Department's 1979 teacher forecasting notes.
- b. Based upon the 1979 secondary schools staffing formula.
- c. As estimated in the Department's 1979 teacher forecasting notes.
- d. Based upon resignation statistics 1978-1979, (see Table 4.4 of this report).
- e. As explained in the text accompanying Figure 3.2, (see Chapter 3).

rate means a loss of 170 teachers during 1980. Resignation statistics 1978-1979 shown in Table 4.6, allow the total loss to be further analysed into specific subjects. By calculating the number of teachers per subject on hand at the beginning of 1980, and by calculating the subject specialist demand for 1981, it becomes a matter of arithmetic to estimate the extent and nature of recruitment required for 1981.

As was also true of the demand estimates, both subject loss and recruitment statistics have been expressed in full-time equivalent terms. As many secondary teacher training courses allow teachers to move freely between at least two fields of specialisation⁵, the use of full-time equivalent terms enables considerable flexibility in planning both studentship scheme intake and general recruitment activities. Taking the case of Science specialists for 1981 as an example, the required number of recruits may be as low as eighteen - or may be thirty or higher; and may be recruited exclusively from the studentship scheme, or from numerous sources.

In view of the possible sources of error associated with supply planning, this flexibility is a welcomed aspect. The methodology in Figure 4.6 shares with the Department's model the several uncertainties entailed in the projection of teacher wastage rates. The methodology also risks compounding these possible errors by attempting to relate gross wastage to individual subjects. The statistics shown in Appendix 8 illustrate the extent of variation that can occur year to year in this respect.

Certainly it needs to be stressed that, as the final product of the subject teacher planning methodology developed in this study, the subject recruitment estimates need to be treated as guidelines only, rather than as fixed quantities. To a limited extent, they should be rendered more trustworthy as more extensive data-bases become established. But while the difficulties incurred in the projection of wastage rates persist, such improvements will necessarily be limited.

"In practice, planning cannot be delayed until we have built completely satisfactory and realistic models and crude models have to be used in the meantime."⁶ The Tasmanian Department, in common with other school systems, continues to need to assess its recruitment requirements, four and more years into the future. The maintenance of a studentship scheme makes it all the more important that staffing needs be as accurately and precisely assessed as is allowed by available information. Despite the restricted support that can be given to the subject recruitment estimates described above, it is contended that they represent an improvement upon present planning procedures. As well as aiming at a higher level of precision than can currently be achieved, a systematic approach to staffing, established upon a reasonably sound statistical base, has the additional advantage of being open to some ongoing testing and if needed, modification.

(C) A comparison with the AEC Working Party and Tertiary Education Commission models.

The similarities between the Tertiary Education Commission planning model⁷ and that used by the Department, mean that the above subject teacher supply and demand planning methodology is also largely applicable to the former. The two models do however, significantly differ at one point from the approach used by the AEC Working Party⁸. In regard to supply, the focus of the AEC model is not to attempt to tune, finely or otherwise, the various supply sources, but to forecast the total numbers of teacher applicants.

The subject supply methodology as applied in Figure 4.2, will need to be adapted, if it be used within the AEC model's framework. The principal change required would be to develop data-bases for pre-service enrolments in each field of speciality, and to project such data across a given time-period to produce estimates of graduation rates of subject specialists. These estimates would then need to be considered in conjunction with other subject-specific estimates concerning the supply levels of specialists from 'other'

sources. (As mentioned in the final chapter of the report, this latter aspect appears as one of the areas most liable to profit from further research and investigation.)

6 TEACHER RECRUITMENT

(A) Gross teacher recruitment numbers.

As a first step in providing a background against which subject specialist recruitment estimates may be considered, the numbers of teachers recruited to the sample of secondary schools in the Tasmanian Department of Education, 1978 - 1980, have been shown in Table 4.8.

The statistics refer almost entirely to local recruits, with out-of-State recruitment being at a very low level - a maximum of around six secondary teachers per year⁹. (The same also holds true of recruits to the studentship scheme: for 1978-1980, only three out-of-State applicants were accepted to commence a secondary teacher training course¹⁰.)

The principal feature of the table is the dominance of the studentship scheme in the Department's recruitment procedures. For 1978 and 1979, around 70% of all recruits were obtained from this source. In 1980, largely as the consequence of the prevailing fall in teacher wastage, studentship graduates accounted for almost 90% of all recruits. (With the exception of a maximum of three teachers per year, all teachers appointed after the commencement of a school year were from non-studentship sources.)

This dominance is more marked when the number of permanent employment opportunities 1978-1980 is considered. The policy until 1980, and which currently is still being enforced¹¹, is that studentship graduates, after the satisfactory completion of a year of probationary service, become permanent employees of the Department. By contrast, only two recruits from other sources were permanently appointed to the service in 1980 - compared with six recruits in 1979 and nine in 1978¹². (Accordingly, some proportion of recruits from 'other sources' shown in the table, would be the same teachers year to

TABLE 4.8: SOURCES OF RECRUITMENT OF TEACHERS IN THE SAMPLE OF SECONDARY SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Source	Number of recruits											
	1978				1979				1980			
	Distr High Matr Total				Distr High Matr Total				Distr High Matr Total			
Appointed at beginning of the school year:												
from studentship scheme	19	110	15	144	21	131	8	160	34	101	7	142
from other sources	1	20	1	22	3	20	4	27	1	5	1	7
Appointed throughout the school year	2	31	0	33	5	28	3	36	0	10	1	11
Total	22	161	16	199	29	179	15	223	35	116	9	160

Source: based upon Personnel Office notices of appointment, Studentship Office publications and principals' annual staffing returns.

Notes:

- a. Relief teachers where identified, have been excluded.
- b. 1980 data current at 1st August 1980.
- c. District high statistics are based upon a head-count of teachers.
- d. Total statistics are a direct sum of constituent statistics.

year, tallied each time their period of employment became renewed.)

The dominance may change from around 1984 onwards, as the policy restrictions on the size of the studentship intake become apparent. The restrictions which were first seriously felt in 1980, reduced studentship intake for that year to 315 trainees - less than 60% of the previous year's level. Whether the reduction will in the future, require the recruitment of other, non-bonded graduates or whether there will be a return to a partial reliance upon experienced re-entrant teachers or even upon interstate recruitment, remains to be seen.

There is a further possibility: that the decline in teacher wastage and/or government decisions to retrain the size of the teaching force, will obviate the need for supplementary sources of recruitment.

(B) Recruits per subject.

Recruits from the Tasmanian Department of Education's studentship scheme appointed to the sample of secondary schools 1978-1980, have been apportioned across subjects, according to the nature of teaching load during the first year of service. The results are shown in Table 4.9.

The subject recruitment estimates already shown in Figure 4.2, may each be considered as a proportion of all recruitment for that year: in other words, the twenty-seven English specialists required, would be equivalent to 17% of all 1981 recruitment. For as long as annual recruitment is largely commensurate with annual wastage, such proportions may be compared with the statistics in Table 4.9 - both to indicate the general feasibility of achieving recruitment requirements, and to explain, in part, specialist supply and demand trends.

TABLE 4.9: FULL-TIME EQUIVALENT TEACHER NUMBERS AND PROPORTIONS PER SUBJECT RECRUITED FROM THE STUDENTSHIP SCHEME TO THE SAMPLE OF SECONDARY SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Subjects	Recruits					
	1978		1979		1980	
	no.	%	no.	%	no.	%
English	32.2	22.4	39.6	24.8	27.0	19.0
Social Science	19.8	13.8	18.9	11.8	24.6	17.3
Mathematics	11.2	7.8	16.4	10.3	17.0	12.0
Science	11.2	7.8	15.4	9.6	21.2	14.9
Physical Education	9.5	6.6	11.0	6.9	9.9	7.0
Manual Arts	9.3	6.5	9.8	6.1	6.4	4.5
Home Economics	8.3	5.8	8.2	5.1	6.0	4.2
Commerce	8.8	6.1	4.5	2.8	1.4	1.0
Art	10.3	7.2	15.2	9.5	5.6	3.9
Music	3.8	2.6	8.2	5.1	9.2	6.5
French	3.9	2.7	3.2	2.0	4.0	2.8
German	2.6	1.8	0.8	0.5	0.9	0.6
Business Studies	1.0	0.7	0.0	0.0	0.7	0.5
Social Psychology	3.1	2.2	0.3	0.2	0.7	0.5
Miscellaneous	9.0	6.3	8.5	5.3	7.4	5.2
Total	144.0	100.0	160.0	100.0	142.0	100.0

Source: based upon Personnel Office notices of appointment, Studentship Office publications and principals' annual staffing returns.

Notes:

a. Any discrepancy between totals and constituent scores due to rounding.

Discrepancy between recruitment requirements and actual recruitment levels 1978-1980, was most marked for English and Social Science teachers. The two categories combined, consistently accounted for just over 36% of all recruits in each of the past three years; on the other hand, they constituted only 28% of estimated recruitment needs. Even on the basis of the reduced 1980 recruitment level, this means an extra twelve or so English and/or Social Science teachers being added annually to an existing surplus situation - which Departmental planners have described as the single most alarming aspect of the Tasmanian secondary teacher supply and demand situation.

Studentship Office publications contain statistics showing the nature of intended pre-service training of new entrants to the studentship scheme¹³. For the period 1978-1980, just under 20% of students each year were trainees in either English/Social Science or English/Speech and Drama. Although some numbers of English or Social Science trainees would be found within other subject combinations, it appears likely from pre-service enrolment trends that after the next few years, teachers in these two subject categories will form a recruitment proportion more in keeping with immediate staffing requirements. However, considering the situation already at hand and the likely specialities of many teachers seeking re-entry, it will probably take several more years for the present surplus situation to be rectified.

Another important feature of the supply and demand of subject specialists concerns the present shortage of Commerce teachers. The annual projected level of 4% of all recruitment, was broadly matched in 1978 and 1979 by actual recruitment from the studentship scheme. In 1980 however, recruitment from this source fell to 1%. The same fall-off has characterized pre-service recruitment levels: in 1978 nineteen Commerce trainees were appointed; in 1979, nine trainees; and in 1980, eight trainees.

The resignation rates of Commerce teachers 1978-1979 were amongst

the lowest of any subject category - an aspect of surprise, considering the high proportion of female teachers in this subject. If the present resignation rates, and thus recruitment projections, are found to understate future developments, the present shortage will continue, if not intensify.

Music teachers represent the other major specialist category currently in short supply. Appointments to this area will need to be around 7% of all recruitment in a given year, if only to maintain the 1980 situation. Despite the rise in actual recruitment from 2.6% in 1978 to 6.5% in 1980, pre-service data indicate that this improvement is unlikely to continue. In 1978, only 4% of new trainees selected Music as a speciality; and in 1979, 3% selected Music. Although in 1980 the proportion rose to 5%, this still meant a head-count of only nine trainees (compared with eight the previous year) - some of whom would be appointed to the primary sector.

Recruitment needs may be compared with actual recruitment levels, not only to explain past supply and demand trends, but also to anticipate future developments.

Mathematics and Science teachers are of special interest in this respect. Departmental officers have reported that for many years past, there has been a general shortage of these specialists. Most recently, however, a state of near-balance has been achieved, with any shortfall being minimal.

Actual recruitment levels for the Mathematics and Science categories combined, 1978-1980, have equalled and finally exceeded recruitment requirements. At the pre-service intake level, the numbers of Mathematics and/or Science trainees in 1978 and 1979 have considerably exceeded annual recruitment needs - the 1979 trainees by as much as 85%. This specific comparison, supplemented by pre-service data, reveals evidence of a slight shortage of specialists presently risking the possibility of turning to an excess.

If the recruitment needs outlined in Figure 4.2 prove basically accurate, the continuation of present recruitment trends will represent at best, only a small step towards achieving a state of balance between the supply and demand of select subject specialists - most particularly, English and Social Science teachers, and Commerce and Music teachers are likely to remain in serious imbalance. Given the small number of vacancies currently open to teacher applicants from other sources, teacher planners are consequently restricted in their range of recruitment options. Not only must staffing needs be anticipated some four years in advance, but adequate numbers of suitable applicants per subject speciality must be available for studentship scheme intake - this against a background need to satisfy the detailed enrolment expectations of the training institutions.

Whatever the other disadvantages might be, a reduction in the size of the studentship scheme might consequently improve some aspects of teacher planning. More opportunities for former teachers to enter the service, constitute a mechanism which would allow a fairly immediate response to be made to any possible miscalculation of staffing requirements. The essential condition for this proposition to be true, is that there must be sufficient numbers of suitable applicants in all subject areas to meet the shortfall between studentship output and estimated demand. This condition remains totally untested - but need not remain so, a point to be discussed in the final chapter of the report.

(C) Appropriateness of pre-service training.

Any use of the sets of subject teacher recruitment estimates to determine appropriate levels of pre-service intake per field of specialisation, assumes that a trainee in one or two given specialities, will when appointed to a school, be active predominantly if not exclusively in these subjects. It remains to test the validity of this assumption.

In 1978, 110 graduates from the Department's studentship scheme were appointed to the sub-sample of high schools; in 1979, 131 graduates were appointed; and in 1980, 101 graduates were appointed. For the bulk of these teachers, a comparison has been made of subjects taught in first year of service with the specialities selected during pre-service training. The results are presented in Table 4.10.

There is ample evidence to suggest a high concurrence between subjects taught and areas of pre-service training. For each of the three years, over three-quarters of studentship-graduate teachers were teaching exclusively in their fields of training - with the majority being active exclusively within their major training areas. For the remaining twenty to thirty teachers per year, on average, 20% of teaching load was in one or more specialities outside of training.

Any discrepancy between field of training and subjects taught, can be most immediately attributed to a possible imbalance between subject supply and demand conditions, at a system-wide level and/or at an individual school level. Even if a working balance has been achieved for the total system, the composite subject specialities of the staff allocated to a specific school could well produce some imbalance.

The teachers active in subjects beyond their training were further examined, in regard both to training areas not utilized in a teaching context, and to subjects taught for which there was no appropriate training. No clear-cut trends were discerned from the above examination. Considering the possibility - the probability, if the total system has achieved some state of subject balance - that an imbalance of specialists at one school would differ in type of subject from another school, the results of this dual examination are not unexpected.

A partial mis-match between training and subject taught, can also result if teachers are limited in their geographic mobility. Slightly

TABLE 4.10: EXTENT OF MATCH BETWEEN TEACHING SUBJECTS AND PRE-SERVICE TRAINING FOR FIRST-YEAR STUDENTSHIP GRADUATES IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Nature of load	First-year teachers					
	1978		1979		1980	
	no.	%	no.	%	no.	%
Teaching in major training areas only	73	70.9	82	65.6	39	41.1
Teaching in major and/or minor training areas only	9	8.7	23	18.4	28	29.5
Teaching in at least one subject outside of training	21	20.4	20	16.0	28	29.5
Total	103	100.0	125	100.0	95	100.0

Source: based upon Studentship Office publications and principals' annual staffing returns.

Notes:

- a. Each year, details of pre-service training could not be obtained for a small number of teachers. (In 1978, there were six such cases, and in both 1979 and 1980, seven teachers.)
- b. Any discrepancy between totals and constituent scores due to rounding.

more than one-half of the 'mis-matched' teachers in each year requested and were granted a specific location at which to teach.

There are three broad planning possibilities at a system level, concerning the placement of teacher recruits:

(i) recruits may be regarded as the most administratively convenient means of filling any shortfall in subject specialist supply in a given school. Although selected for the school largely in accordance with area of pre-service training, it might be that a sizeable portion of recruits' teaching load would be in subjects beyond training. Clearly, given the data underlying Table 4.10, which show that on average, between 92% and 94% of a recruit's teaching load is directly appropriate to pre-service training, this option has not been exercised;

(ii) secondly, it may be considered paramount that recruits be active exclusively in subjects appropriate to their training - a policy that usually would be possible only if more experienced teachers were shuffled amongst subjects for which there were shortages. Although this latter aspect has not been formally tested in this report, it would appear from the data in Table 4.3 that this aspect is at most, of limited relevance to Departmental planning;

(iii) finally, there is the possibility, seemingly most relevant to the Department, that there is sufficient interplay between the fairly general planning estimates made in regard to studentship scheme recruitment and the dual nature of most teachers' pre-service training, to ensure that new teachers receive the advantage of teaching mainly in their chosen specialities - without entailing disadvantage to more experienced staff.

The extent to which this third option will remain viable, is open to doubt. By 1980, there had occurred a marked shift in the proportion of recruits who were able to teach only in their major training areas - a drop from 71% in 1978 to 41% by 1980. Although about one-half of the 30% of recruits so displaced, were able to teach within their minor specialities, nearly one-third of 1980 recruits

taught in at least one subject outside of training.

One possible explanation for this trend is that the imbalance of some categories of subject specialists by 1980 - combined with minimum recruitment being allowed from other sources - prevented a full matching of recruits' pre-service training with actual teaching duties. The hypothetical nature of this explanation is stressed. If true however, given some of the data previously discussed in this chapter, the trend could well persist if not intensify, over the next few years at least. A more regulated and planned studentship intake would be one means of arresting the trend.

7 PLANNING FOR SUBJECT SPECIALISATION

In the introduction to this report, it was suggested that in a secondary educational system, planners are confronted with two broad tasks arising from subject specialisation:

- (i) the problem of meeting annual recruitment needs per subject;
- (ii) the problem of ensuring that for each school year, schools are adequately staffed appropriate to their curriculum offerings, after taking account of teacher transfers, resignations and appointments of new teachers.

The methodology for estimating the supply and demand of subject specialists relating to the former task, has been discussed.

This leaves the second task to be considered - a major component of which is the relationship between the several criteria used to define subject specialists. It may be recalled that specialist demand estimates were based upon the number of teaching periods allocated to each subject in schools' timetables. For each school, each total number of subject periods was then expressed as a ratio of the average number of periods taught by teachers in that school, to yield the full-time equivalent number of subject specialists that would have been required. Supply estimates per subject on the other hand, initially assumed that all teachers active in a given subject were specialists, regardless of training or expertise. Put another way, the total numbers of subject specialists were a head-count of all teachers active in that subject.

Table 4.11 compares the results of these two different approaches when applied to the high school sub-sample, 1978-1980.

In any of the three years, the number of teachers active in any of the four major subjects (English, Social Science, Mathematics and Science) was approximately double the full-time equivalent number

TABLE 4.11: A COMPARISON OF FULL-TIME EQUIVALENT TEACHER NUMBERS PER SUBJECT WITH THE TOTAL NUMBERS OF TEACHERS (HEAD-COUNTS) ACTIVE PER SUBJECT IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Subjects	Teachers								
	1978			1979			1980		
	Fte no.	Head count	Mean fte loading	Fte no.	Head count	Mean fte loading	Fte no.	Head count	Mean fte loading
English	188	339	0.55	189	346	0.55	196	372	0.53
Social Science	141	267	0.53	141	271	0.52	141	292	0.48
Mathematics	161	289	0.56	157	293	0.54	154	299	0.52
Science	145	231	0.63	142	242	0.59	145	239	0.61
Physical Education	83	110	0.75	83	107	0.78	90	139	0.65
Manual Arts	152	165	0.92	153	163	0.94	145	150	0.97
Home Economics	96	98	0.98	95	101	0.94	102	113	0.9
Commerce	71	91	0.78	70	86	0.81	67	89	0.75
Art	84	101	0.83	83	97	0.86	79	96	0.82
Music	55	76	0.72	57	66	0.86	58	73	0.79
French	32	59	0.54	29	49	0.59	29	56	0.52
German	14	31	0.45	13	25	0.52	13	28	0.46
Miscellaneous	66	203	0.33	98	370	0.26	100	379	0.26
Total	1287	2060		1307	2216		1319	2325	

Source: based upon principals' annual staffing returns.

required - with teachers therefore having an average subject loading of around 0.5. In Manual Arts and Home Economics, and to a slightly lesser extent in Physical Education, Commerce, Art and Music, there was a greater concurrence between full-time equivalent numbers and head-counts. Accordingly, there were also higher subject loadings - 0.9 or above for Manual Arts and Home Economics and around 0.8 for the other subjects.

The consistent nature of these figures across the three years, suggests it to be a relatively straightforward task to move freely between these two criteria for defining specialisation. This facility however, is of limited value, unless planners are also able to reach some understanding of the range and nature of the subjects in which teachers may specialize.

It is customarily assumed that certain subjects or subject-combinations are most prevalent: specifically, English and/or Social Science; Mathematics and/or Science; Physical Education; Manual Arts; Home Economics; Commerce; Art; Music; French and/or German; Business Studies; and Social Psychology. The full range of possible subject-combinations however, is largely undetermined.

In the construction of the previous table, large numbers of different combinations were found to exist year to year. In 1978, the 1640 teachers in all schools in the sample, taught a total of 135 different combinations. Comparable numbers of different combinations were found in 1979 and 1980: 130 and 144, respectively.

Even within a specific subject area, there were high numbers of combinations. This was most marked for the four major subjects, where teacher numbers were highest, but was also true to an appreciable extent for other areas. Using the 1978 set of statistics to illustrate this point:

(i) just over one-half of all teachers active in English, taught exclusively in English or English/Social Science, leaving a further

155 teachers spread across 46 different combinations;

(ii) about the same proportion of teachers in the Mathematics area taught exclusively Mathematics or Mathematics/Science, leaving another 92 teachers in 28 other subject-combinations;

(iii) 70% of both Manual Arts and Home Economics teachers taught exclusively in their appropriate subjects, leaving 48 teachers in 10 other combinations, and 28 teachers in 12 combinations, respectively.

It may be seen from Table 4.12 that the conventional subjects or subject-combinations listed above, account for some two-thirds of all teachers. (The slight decline in this proportion 1979 and 1980 may be attributed again, to the increased numbers of teachers having a very limited involvement in Miscellaneous curriculum options.) The reasonably constant proportions of teachers active exclusively in a listed subject or subject-combination across the three years, suggest these data may be confidently used in a teacher planning context.

As a result of the data summarised in the preceding two tables, a number of quantifiable generalisations can accordingly be made. Either at a total secondary level or still with safety at a Regional level, the following steps in teacher planning may be made from a sound statistical basis:

- (i) estimation of full-time equivalent teacher demand per subject;
- (ii) estimation of actual or 'head-count' number of teachers likely to be required for each subject;
- (iii) for about two-thirds of a teaching force, estimation of the number of available specialists per subject or select subject-combination, (where specialisation is defined in terms of previous subject teaching experience).

It is not being suggested that in the allocation of staff to schools, there will merely be an application of the above three steps. Certainly at the level of the individual school, Departmental officers will continue to be required to juggle figures relating to teachers entering, leaving or transferring within the secondary system, their

TABLE 4.12: PROPORTIONS OF TEACHERS PER SUBJECT OR SUBJECT-COMBINATION TAUGHT IN THE SAMPLE OF SECONDARY SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Subjects	Teachers (%)		
	1978	1979	1980
English	6.1	5.7	5.0
Eng/Soc Science	8.1	8.1	7.7
Social Science	3.9	2.8	3.1
Mathematics	4.5	4.5	4.4
Maths/Science	9.6	9.5	7.7
Science	5.2	4.8	5.4
Physical Education	4.3	4.0	4.2
Manual Arts	7.2	7.1	6.3
Home Economics	4.4	4.6	4.3
Commerce	3.4	2.7	2.4
Art	4.6	4.3	4.1
Music	3.3	2.6	2.9
French	0.4	0.4	0.6
French/German	0.6	0.1	0.4
German	0.2	0.2	0.3
Business Studies	0.6	0.6	0.6
Social Psychology	0.9	0.6	0.7
Miscellaneous	1.8	2.9	3.4
Other Combinations	29.2	33.5	35.5
No Teaching Load	1.8	1.1	1.1
Total	100.0	100.0	100.0

Source: based upon principals' annual staffing returns.

Notes:

a. Any discrepancy between totals and constituent scores due to rounding.

subject specialities, extent of geographical mobility, school preferences, etc. Inevitably, teacher allocation at a Regional or at some other composite level, will represent the sum of individual school allocations and will not be derived from a series of statistical generalisations.

What is being suggested is that the three facilities described above, will serve to provide a useful framework - within which these subject-specific planning activities can be balanced, particularly by establishing guidelines to the options available to teacher planners; and within which, the feasibility of planned staffing allocations can be tested.

FOOTNOTES

- ¹ Tasmanian Education: Next Decade.
- ² In: Education Department of Tasmania, Research Branch,
Teacher Education: Estimate of Required Recruitment to
Departmental Studentships, 1979-1990.
- ³ See Appendices 1 and 2.
- ⁴ In: Teacher Supply and Demand in Tasmania, 1980-1990.
- ⁵ See Education Department of Tasmania, Guide to Teacher Education.
- ⁶ Ahamud, 'Teachers in England and Wales', p283.
- ⁷ See Working Paper on the Supply of and Demand for New Teacher
Graduates in the 1980s.
- ⁸ See The Supply of and Demand for Teachers in Australian Primary
and Secondary Schools 1978-1985.
- ⁹ Based upon Personnel Office records.
- ¹⁰ Education Department of Tasmania, Studentship Selection Report,
1978-1980.
- ¹¹ Albeit shakily, in view of the anticipated 1981 teacher
supply.

¹² Based upon Personnel Office notes of appointment.

¹³ Education Department of Tasmania, Studentship Selection Report,
1978-1980.

CHAPTER 4

RESULTS

SECTION B

SELECT SCHOOL AND EDUCATIONAL CONDITIONS

1 PUPIL-TEACHER RATIO AND AVERAGE CLASS SIZE

Table 4.13 shows for the high school sub-sample, the pupil-teacher ratio, the actual average class size and the theoretical average class size, 1978-1980.

It needs be mentioned that the teacher numbers used in calculating the pupil-teacher ratio, pertain only to those on active duty in high schools at the beginning of each school year. Over the period, teacher-librarians, laboratory technicians and teaching staff on extended leave, together comprised 9.5-10.5% of all high school Education Act appointees¹. Had they been included in the pupil-teacher ratio calculation, as is customarily the case², the ratios shown in the table would have been reduced - in 1978, the pupil-teacher ratio would have fallen to 13.5, in 1979 to 12.8, and in 1980 to 12.1.

By 1979, the high school pupil-teacher ratio shown in the table, had improved by 4.7% of that of the previous year, and by 1980 had improved by a further 5.7%. The latter improvement seems to contradict the decision made in 1979, virtually to maintain current staffing standards at least for 1980 - and also exemplifies the

TABLE 4.13: PUPIL-TEACHER RATIOS AND ACTUAL AND 'THEORETICAL' AVERAGE CLASS SIZES IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Teaching conditions	Year		
	1978	1979	1980
Pupil-teacher ratio	14.8	14.1	13.3
Average class size (actual)	21.6	21.3	20.5
Standard deviation	1.3	1.2	1.3
Average class size(theoretical)	21.4	20.8	19.7
Standard deviation	1.5	1.3	1.4

Source: based upon principals' annual staffing returns and Research Branch enrolment information.

difficulties arising from the four-year time-lag, which beset the Department's teacher supply and demand planning.

The number of studentship graduates to be recruited in 1980, was calculated in 1976, based in part upon prevailing teacher wastage rates. Given the Department's policy of employing all studentship graduates, the fall in wastage - 1979 resignations were only slightly more than half those of 1976 - has meant that despite the intended curtailment of recruitment activity, the 1980 sub-sample of high schools were over-staffed by some 75 teachers at the beginning of the school year.

In regard to Table 4.13, it needs also be pointed out that the class enrolment data provided by principals, were often incomplete - especially with regard to the minor curriculum options categorized as Miscellaneous, where small classes would be expected. The average class sizes shown in the table, might therefore to a very limited extent, overstate the actual situation.

The first issue to be considered is whether the pupil-teacher ratio and average class size in practice fall at equal rates. At the very least, a broad relationship was found between the two variables - with average class size proving responsive to a fall in the pupil-teacher ratio. The extent of the pupil-teacher ratio change 1978-1980, was however consistently greater: over the three years, it improved by 10.1%, compared with a 5.1% reduction in class size.

The critical requirement that teacher loadings remain constant if there are to be equal rates of fall, was not met. The average teacher loading in 1978 was 69.0% of a school cycle and declined to 67.5% in 1980. However the reduction of classroom contact time was by 1980, equivalent to the loss of only 20 teachers - compared with the gain of 135 teachers, arising from the pupil-teacher ratio improvement.

Other factors were also responsible for the two different rates

of change, including the incomplete data base discussed above. The pattern of distribution of the additional staff, is considered to be the most important of these factors. For example, especially for 1978-1979, much of the pupil-teacher ratio improvement arose from the increased provision of remedial teachers - who, because they were restricted to a small sector of the pupil enrolment, and because they frequently operated on near to a one-to-one basis, had only a restricted impact upon average class size. As a generalisation, the more restricted the additional staff are in their availability across a school, the greater the likely discrepancy between the improvement rates of the pupil-teacher ratio and the average class size.

The second part of Table 4.13 shows the theoretical average class size, calculated on the basis of the pupil-teacher ratio and teacher loading. Given the similarity between theoretical and actual class sizes, the formula detailed in the previous chapter allows educational planners reasonable movement between the two concepts of pupil-teacher ratio and class size.

That the average class size is in practice, a reasonably meaningful guide to the range and distribution of class sizes in a secondary system, is borne out by Table 4.14 - which shows the distribution of class sizes in the high school sub-sample, for each of the years 1978-1980.

It is stressed that the distributions do not represent the total number of classes taught in schools during this period. The most precise unit of class size which could be calculated from available data, was the average class size for each subject for each school. Given this qualification, both the actual and theoretical average class sizes were at or close to the mid-point of the appropriate distribution. Additionally, around 50% of classes were within four pupil-units of the average sizes; 75% were within five pupil units.

It has been established that over the three years, the fall in

TABLE 4.14: CLASS SIZES IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Class size:	1978			1979			1980		
	no.	%	cum %	no.	%	cum %	no.	%	cum %
less than 12	9	2.7	2.7	8	2.4	2.4	8	2.4	2.4
12	1	0.3	3.0	1	0.3	2.7	2	0.6	3.0
13	3	0.9	3.9	4	1.2	3.9	3	0.9	3.9
14	8	2.4	6.3	4	1.2	5.1	7	2.1	6.0
15	6	1.8	8.1	12	3.5	8.6	8	2.4	8.4
16	16	4.8	12.9	15	4.4	13.0	18	5.3	13.7
17	16	4.8	17.7	21	6.2	19.2	33	9.7	23.4
18	24	7.2	24.9	24	7.1	26.3	35	10.3	33.7
19	30	9.0	33.9	31	9.1	35.4	34	10.0	43.7
20	16	4.8	38.7	20	5.9	41.3	28	8.2	51.9
21	22	6.6	45.3	25	7.4	48.7	25	7.4	59.3
22	30	9.0	54.3	30	8.8	57.5	27	7.9	67.2
23	33	9.9	64.2	29	8.6	66.1	40	11.8	79.0
24	28	8.4	72.6	40	11.8	77.9	37	10.9	89.9
25	32	9.6	82.2	32	9.4	87.3	13	3.8	93.7
26	32	9.6	91.8	25	7.4	94.7	8	2.4	96.1
27	13	3.9	95.7	5	1.5	96.2	9	2.6	98.7
28	11	3.3	99.0	10	2.9	99.1	3	0.9	99.6
29	4	1.2	100.2	0	0.0	99.1	2	0.6	100.2
more than 29	0	0.0	100.2	2	0.6	100.0	0	0.0	100.2
Total	334	100.0	100.0	339	100.0	100.0	340	100.0	100.0

Source: based upon principals' annual enrolment returns.

Notes:

a. Any discrepancy between totals and constituent scores due to rounding.

average class size did not keep pace with the fall in the pupil-teacher ratio. After allowing for the change in teacher loadings during the period, class size fell by about 60% of the pupil-teacher ratio rate. What is to be determined, is whether class size reduction was equally spread across all class sizes.

Table 4.14 shows that the improvements in pupil-teacher ratio had negligible impact upon the incidence of classes at the lowest points of the distribution, but did succeed in otherwise producing a downwards shift in the distribution. In 1978, 8.1% of classes had fifteen or fewer pupils - a proportion which was largely unchanged over the next two years. However the proportion of classes of any greater size, consistently fell during 1978-1980: as a specific example, 27% of 1978 classes had more than twenty-four pupils, compared with 10% of 1980 classes.

Even putting aside the lowest extremes of the distribution, the extent of downwards displacement over the three years was not equally spread. The middle and to a lesser extent, upper ranges tended to be most influenced: whilst the 20th and 30th percentiles were each displaced by some 5% of their 1978 values, the middle percentiles were displaced by as much as 8% and the 80th and 90th percentiles by around 6%.

In examining the class sizes in each school, a distinct and stable pattern emerged over the three years. The four major subjects (English, Social Science, Mathematics and Science) with Physical Education, consistently returned the highest class sizes, whilst Manual Arts, Home Economics, Art, Music and Miscellaneous had the smallest classes - around three-quarters the size of the former subjects. Class sizes of other subjects, again fairly consistently, were positioned between these two groups.

Each year, the improvement in the pupil-teacher ratio was accompanied by reductions in the average class size of all except two

subjects. The exceptions were Home Economics and French, where class size remained effectively constant.

The staffing allocation procedures used by the Department, ensure that the additional staff allowed by pupil-teacher ratio improvements, are generally shared by all schools. Perhaps contrary to prevailing opinion³, the pupil-teacher ratio improvements were also largely shared across the range of classes within each school. It is not likely that this latter aspect is due to any intrinsic quality of the pupil-teacher ratio - but rather, could be due to the concern of teachers in each school for an equality of working and teaching conditions. Whatever the cause, it is suggested that the data presented in the section, provide considerable if qualified, support for the pupil-teacher ratio as a planning concept, and as an index of the class size conditions to be found within a school system.

2 TEACHER LOADINGS

The number and proportion of teachers substantively appointed to promotional positions in the sample of schools, 1978-1980, are shown in Table 4.15. Each year, around three-quarters of teachers were in non-promotional positions - with the bulk of others having been appointed to senior master positions. Because of this distribution, any system-wide reduction in the loadings of principals and vice principals, will entail minimal additional personnel resources. Changes in the loadings of base teachers and to a lesser extent, senior masters, will have a more substantial impact in this regard.

Although peripheral to the main aim of this section, a point of interest concerns the slight but persistent fall in the proportion of promotional positions - a fall still evident after allowing for the increased incidence of part-time staff over the three years. Had the 1978 proportions of promotional staff persisted to 1980, about forty extra teachers would have been promoted. This may be seen as a continuation of the trend discussed in Chapter 2 and may lead ultimately to some recovery in teacher wastage.

Table 4.16 shows the loads of high school teachers in promotional and in base-grade positions, 1978-1980, expressed as proportions of a school cycle.

Within reasonable limits, individual schools are free to accept or modify the loading recommendations presented by the Tasmanian Teachers Federation, which underly the 1977 Staffing Agreement. Recommendations for the secondary sector are:

- (i) principal nil loading;
- (ii) vice principal 0.2 loading;
- (iii) senior master 0.5 loading;
- (iv) base teacher 0.7 loading.

TABLE 4.15: NUMBERS OF TEACHERS SUBSTANTIVELY APPOINTED TO PROMOTIONAL AND BASE-GRADE POSITIONS IN THE SAMPLE OF SECONDARY SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Promotional status	Type of school											
	1978				1979				1980			
	Distr		High		Matric		Total		Distr		High	
Number:												
principal	9	27	5		9	27	5		9	28	5	
vice principal	..	46	10		..	43	10		..	45	9	
senior master	29	225	62		27	224	60		27	221	62	
base teacher	94	989	131		104	1013	144		113	1025	173	
total	132	1287	208		140	1307	219		149	1319	249	
Percentage:												
principal	6.8	2.1	2.4	2.8	6.4	2.1	2.3	2.7	6.0	2.1	2.0	2.6
vice principal	...	3.6	4.8	3.3	...	3.3	4.6	3.0	...	3.4	3.6	3.0
senior master	22.0	17.5	29.8	19.9	19.3	17.1	27.4	18.9	18.1	16.8	24.9	18.1
base teacher	71.2	76.8	63.0	74.1	74.3	77.5	65.8	75.4	75.8	77.7	69.5	76.3
total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: based upon Personnel Office records.

Notes:

a. Promotional status as at August of each year.

b. Vice principals in district high schools are conventionally regarded as primary sector personnel.

TABLE 4.16: A COMPARISON OF THE LOADINGS OF TEACHERS SUBSTANTIVELY APPOINTED TO PROMOTIONAL AND BASE-GRADE POSITIONS IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

Promotional status	Teaching load		
	1978	1979	1980
Principal	0.11	0.11	0.1
Vice principal	0.27	0.33	0.34
Senior master	0.59	0.61	0.6
Base teacher	0.74	0.73	0.72

Source: based upon Personnel Office records and principals' annual staffing returns.

Notes:

- a. See the preceding table for numbers per promotional category.
- b. Promotional status as at August of each year.
- c. Teaching load has been expressed as a proportion of the school cycle.

It may be seen from the table, that the various loadings are within broad proximity only, to the recommended levels.

Perhaps as a consequence of the Federation's priorities for the implementation of loading reductions, the limited changes that did occur 1978-1980, most favoured teachers in non-promotional positions. Although the extent of annual reduction in this regard appears small, it has been equivalent to an extra fifteen or so teachers per year - a recruitment level which in 1980, represented 10% of all recruitment to the high school sub-sample.

The increase in vice principals' loadings, is largely attributable to the recent provision of two such positions, for most high schools. This has meant that vice principals have reduced administrative duties, consequently allowing a higher teaching load. (The 1979 secondary schools staffing formula for high schools, assumes a 0.4 loading.)

Despite the extra recruitment in 1978 and 1979 as a result of the Staffing Agreement, much of the recruitment burden arising from the achievement of loading recommendations, has yet to be borne. Based upon 1980 teacher numbers and loadings, an extra 90 teachers will be required if the senior master and base teacher loading reductions are to be achieved for the total high school sector. (The situation is worsened, when it is considered that the actual loadings 1978-1980 were obtained at the beginning of each school year - at a time when schools were frequently over-staffed, and when teacher loadings were frequently lower than would be the case later in the year.)

In addition to the decision to defer for 1980, the provisions of the Staffing Agreement, the delay in achieving loading reductions may also be attributed to the lowered class-sizes 1978-1980, as discussed in the previous section. The improved secondary pupil-teacher ratio over the last three years has meant an additional 135 teachers - with improvements in class size having absorbed most of the additional

staff.

This aspect well illustrates a limitation of the pupil-teacher ratio as a planning device. The lowered ratio used in the Department's planning model may be traced directly to a series of improvements suggested in the Staffing Agreement, relating to teachers' reduced classroom contacts. Despite the the pupil-teacher ratio target having been largely reached, the specified improvements have clearly not been achieved - with the bulk of staffing benefits having been channelled into alternative areas.

Another aspect of the Teachers Federation loading policy (not reflected in the Staffing Agreement), concerns reduced loadings for teachers in their first year of service. With the recommended loading of other base teachers being 0.7 of a school cycle, the suggested loading for first-year teachers is 0.6.

Table 4.17 shows that by 1980, only very limited steps had been taken to differentiate between first-year and other teachers in this regard. If the 0.6 loading is applicable only to recruits direct from pre-service training, the 101 new graduates appointed to the high school sub-sample in 1980, would have required an extra fifteen experienced teachers to enable the specified loading reduction.

Clearly, the recommendation made in the Secondary Schools Report ⁴ explicitly covering this aspect, is far from being achieved.

TABLE 4.17: FIRST-YEAR TEACHERS' LOADINGS COMPARED WITH THE LOADINGS OF OTHER BASE-GRADE TEACHERS IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980.

	1978		1979		1980	
	no.	load	no.	load	no.	load
Teachers:						
first-year	110	0.73	131	0.72	101	0.71
other base-grade	879	0.74	882	0.73	924	0.72

Source: based upon principals' annual staffing returns, Studentship and Personnel Office data.

Notes:

a.'First-year' teachers are restricted to those recruited from the Department's studentship training scheme.

b.Teaching load has been expressed as a proportion of the school cycle.

3 TEACHER CHARACTERISTICS

(A) Teacher age and projected retirement rates.

The age profile of the 1978 high school teaching force in the Tasmanian Department of Education at August of that year, is given in Figure 4.3.

There is a general pattern, whereby the high proportions of teachers in the lower age-groupings are consistently reduced as the age factor is increased. This distribution may be readily explained, partly by past recruitment patterns, partly by the fact that the older age-groupings have over a longer span of service, experienced proportionally greater total loss. The decline in secondary teacher resignation rates over the last decade, has served to emphasize the 'tailing off' effect.

The distribution was found to be influenced considerably by sex of teacher. As an example, the tailing effect in the case of females was reversed for teachers aged 46-50 years - meaning about 30 or so teachers more than would be expected. (This age bulge appears in diluted form in Figure 4.5.) The most probable explanation arises from those teachers returning to the workforce at around this age, after having completed child-raising duties. In 1978 as an example, almost 40 female teachers were admitted to the sub-sample of high schools from non-studentship sources, the vast majority of whom were re-entrants.

The other major difference found between the male and female age distributions, was the much higher proportion of female teachers - well over double that of males - aged 21-25 years. As a flow-on from this aspect, almost 60% of all female high school teachers in 1978, were 30 years or younger, compared with just over 40% of males. Undoubtedly this reflects the greater tendency for

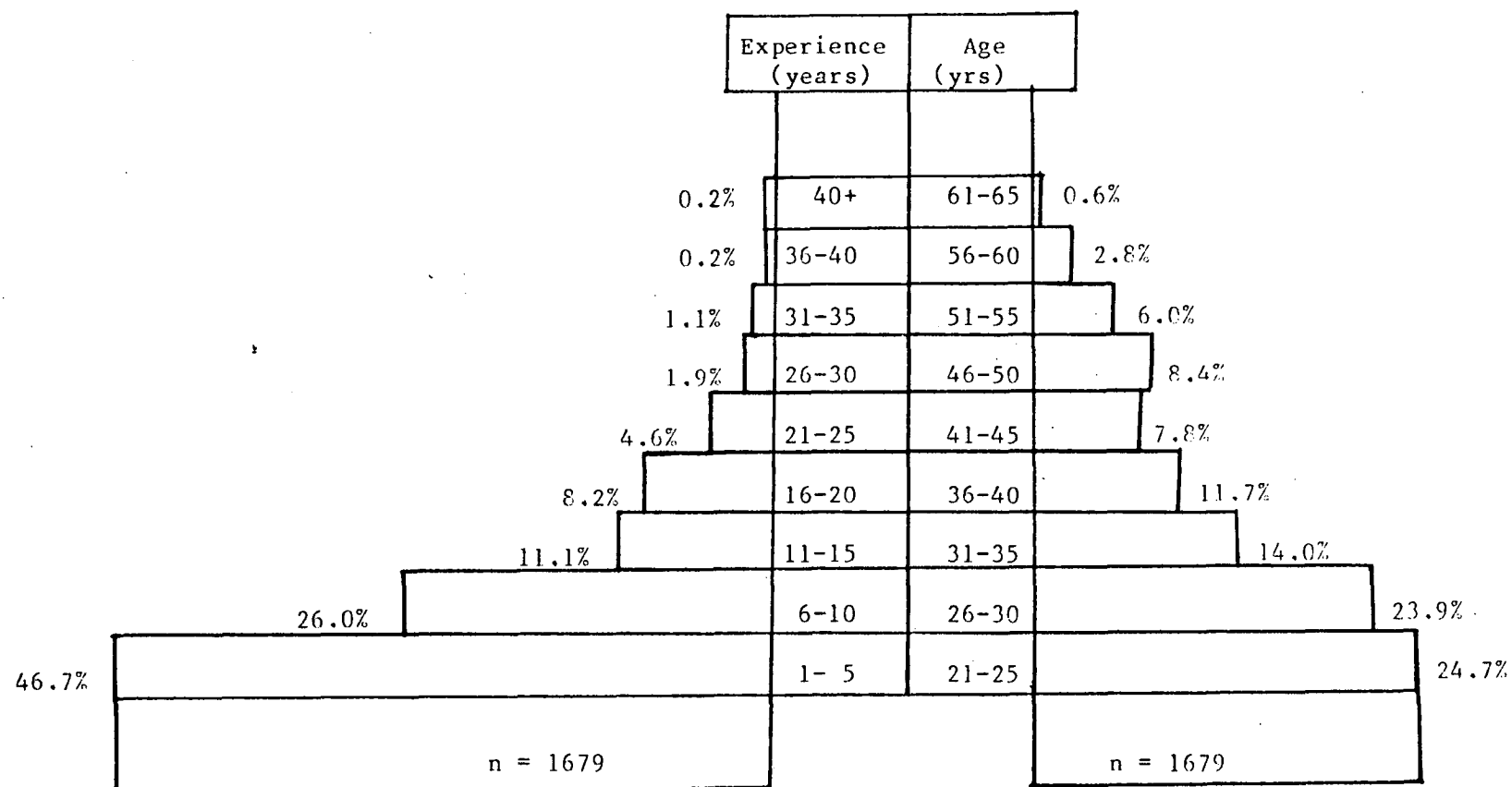


FIGURE 4.3: EXPERIENCE AND AGE PROFILES OF ALL HIGH SCHOOL EDUCATION ACT APPOINTEES EMPLOYED BY THE TASMANIAN DEPARTMENT OF EDUCATION AT AUGUST 1978.

Source: based upon Research Branch information.

females to leave the teaching force at an earlier age, especially to undertake marital/family duties. The overall effect of this feature was a female teaching force with a median age of only 28 years, compared with 33 years for the male teaching force.

Teacher retirements whilst directly attributable to age - 65 years for males, 60 years for females, or earlier for voluntary retirement - may also arise from health factors. During 1978 there were in total, twenty-one high school teacher retirements: seven were compulsory due to age, four were voluntary and ten were due to ill-health. Eight of the latter were teachers within the sub-sample of high schools and all except one, were 53 years of age or older. A comparable situation existed in 1979: a total of fifteen retirements, six compulsory, five voluntary and four because of health. All teachers retiring due to poor health, were within the sub-sample and only one was less than 54 years of age.

Although there is risk in making generalisations from such small numbers, two working assumptions have been drawn:

- (i) teacher retirements due to ill health bear a close relationship to teacher age;
- (ii) because of this relationship and given the reasonably regular age distribution of teachers at the upper extremes, the total number of high school teacher retirements in a given year, will be triple the number of teachers reaching compulsory retirement age.

Further assuming no other form of teacher movement into or out of the system, projected retirement rates may be readily calculated from the 1978 age data.

These projections for the period 1979-2003, are presented in Table 4.18.

In practice, various other forms of teacher movement will occur. Consequently, teacher resignations 1978-1980 have been analysed in relation to possible impact upon retirement projections:

TABLE 4.18: PROJECTED HIGH SCHOOL TEACHER RETIREMENT RATES IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1979-2003.

Years	Retirements due to age: average annual rate	All retirements: average annual rate
1979-1983	9	27
1984-1988	10	30
1989-1993	22	66
1994-1998	24	72
1999-2003	29	87

Source: based upon Research branch information.

(i) throughout 1978, a total of 95 high school teachers from the sub-sample resigned. 67% were thirty years or younger and a further 26% were 31-40 years of age - only 7% or five teachers, were aged above 40 years. As would be expected, the female teaching force had higher resignation rates amongst the lower age groups, with 73% of all female resignees being 30 years or younger;

(ii) throughout 1979, 55 teachers from the high school sub-sample resigned. 70% were thirty years or younger, 22% aged 30-40 years and only 7% or four teachers, were aged above forty years. Again, female resignees were relatively younger, 70% being aged thirty years or less.

If the above age-pattern characterizing teacher resignees persists, teacher resignations will accordingly have minimal effect upon the above retirement projections.

Recruitment constitutes the other main form of teacher movement. It is most probable that new graduates will be equivalent to at least three-quarters of annual recruitment - the vast bulk of whom will be in the age range 20-30 years and thus unlikely to influence the projections in Table 4.18. At most, a further 40 to 50 recruits per year would be expected from other sources, given present recruitment trends. As a sizeable portion of this latter group would be re-entrant teachers, particularly female teachers around 45-50 years of age, the effect would be to maintain the age 'bulge' already described and therefore to increase slightly the projected retirement rates.

If this latter tendency is set against the also slight tendency for resignation rates to lower the retirement projections, the levels presented in the table, may be accepted.

The levels suggest that over the next decade, there will occur a minor increase in retirement numbers, so that by 1988, some 30 teachers per year will be retiring. During the early 1990's as the

relatively large proportions of male teachers presently aged 51-55 years and female teachers aged 46-50 years, reach or approach compulsory retirement age, annual retirements will rise abruptly to an average level of 66 and thereafter continue to climb, although at a reduced rate. By 2003, retirement will be at a level of almost 90 teachers per year.

Current Departmental teacher planning puts the expected annual wastage due to retirements, at about 1.5% of the total teaching force. Based upon the Department's secondary teaching force projections, for the next decade this estimate will prove satisfactory. By 1990 however, retirements will have increased to about 4%; by 2003, to about 5%. In terms of recruitment, this will mean an extra 40 or so teachers to be found per year by 1990; and an extra 50 or thereabouts by the turn of the century. The magnitude of this additional recruitment burden is best assessed by considering that during the years 1978-1980, the average number of high school teachers recruited per year, was less than 200.

The bulk of projected teacher wastage is presently attributed to resignations. Clearly, if the above retirement projections are basically valid, this will cease to be. Given the prevailing fall in teacher resignations, by 1990, retirement and resignation rates will be very close to equal.

Changes in future resignation patterns may alter the retirement projections. Given a teaching force containing greater numbers of older teachers, it is possible that new conditions will arise from this age factor, which will lead to a recovery in resignations. Increased numbers of teachers aged 40 and above, unless accompanied by increased numbers of promotional positions, might lead many to transfer to employment with better career prospects. The introduction of permanent part-time employment in its various forms, could result in older teachers resigning from full-time positions. Contrary developments are also possible. A fall in both number and proportion of female teachers of child-bearing age, for example, will in turn

reduce resignations due to child-raising/domestic reasons.

Should the retirement projections be proved in error, the total extent of future wastage will remain largely unchanged. The major variable will be when the various levels of wastage occur. Whether due to retirement or to resignation, the age-structure of the 1978 high school teaching force must inevitably lead to higher future wastage than is currently planned for.

It has been assumed throughout the above discussion, that the high school teaching force 1979-2003, will not be reduced in size, despite the likelihood of a dwindling secondary school enrolment; and that consequently, increased wastage will require commensurately increased recruitment activity.

The most likely outcome in this context, is that improved pupil-teacher ratios will be maintained until 1983, and thereafter will remain constant.⁵ The result will be a secondary teaching force peaking in 1984,⁶ and then falling by an average of 50 teachers per year thereafter. Should this occur, the increased recruitment occasioned by heavier retirement losses will be more or less offset by constant staffing standards.

Regardless of what specific assumptions might be made about future movements in secondary pupil-teacher ratios, a failure to consider the increased incidence of retirements will lead to some measure of shortfall in projected recruitment levels - perhaps as high as 40 to 50 teachers per year. Whilst shortfalls of this magnitude are not expected at least for the next decade, and thereafter become increasingly shaky as the period of projection lengthens, it is considered that the retirement estimates presented in this section, have sufficient probability to justify a detailed consideration in the Department's future teacher supply and demand exercises.

(B) Teacher experience and long service leave.

Teaching experience of high school teachers in the Tasmanian Department of Education at August 1978, has also been shown in Figure 4.3.

Teaching experience is in accordance with expectations: i.e. high proportions of teachers with limited experience, markedly reducing as the experience factor is increased. In round terms, 50% of all 1978 high school teachers had five years' or less experience, and a further 25% had only six to ten years' experience. This was more marked for the female sector - 60% and 25% respectively - compared with 40% and 25% for males. (The measures of experience refer only to teachers' current periods of employment and do not indicate total teaching histories. The accumulated teaching experience of the female sector in particular is accordingly understated, due to the non-consideration of past service of re-entrant teachers.)

Ten years of continuous service qualifies a teacher for either three months' leave on full pay or six months' leave on half pay. In projecting the incidence of leave entitlements, it was necessary to give detailed attention to the various forms of teacher movement into and out of the service.

First, there is the joint impact of teacher resignation and consequent recruitment. During 1978, 95 high school teachers resigned from service; 67% had a maximum of five years' experience; 23% had between six and ten years' experience; and overall, the median length of service was less than four years. For the 55 high school resignees in 1979, 70% had no more than five years' experience, with a further 27% having no more than ten years; the median length of service was less than three years.

Although the earliest years of service when long service leave

entitlements are minimal, are most strongly associated with resignation, it remains that resignees with a median length of service of three to four years, are replaced by recruits with nil leave entitlements.

In preparing long service leave entitlements 1979-2003, the following assumptions have been made:

- (i) the annual resignation rate from 1980 will be 5.0%;
- (ii) the extent of experience of 1978 and 1979 resignees, will also characterize future resignees over the period of the projections;
- (iii) each resignee will be replaced by a new teacher.

The second major form of teacher movement concerns retirements and consequent replacements - a factor which acquires increased importance in the light of the preceding section.

Making due allowance for these two wastage components, projected incidence of long service leave entitlements 1979-2003, is presented in Table 4.19.

During 1978-1980, on average 83 high school teachers per year took long service leave: the number actually entitled to leave during this period would have been somewhat higher. The projected incidence of long service entitlements will be of the same general order - and thus unlikely to have a great impact upon supply and demand planning. Even at its peak during the five years 1984-1989, temporary loss due to this factor will require an additional ten or so teachers per year to act in a relief capacity.

TABLE 4.19: PROJECTED INCIDENCE OF LONG SERVICE LEAVE ENTITLEMENTS FOR HIGH SCHOOL TEACHERS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1979-2003.

Years	Average annual incidence of long service leave	Average annual full-time equivalent loss of teachers
1979-1983	100	33
1984-1988	133	44
1989-1993	101	34
1994-1998	125	42
1999-2003	108	36

Source: based upon Research Branch information.

Notes:

a. Assuming that all teachers take three months' leave immediately upon entitlement in calculation of full-time equivalent loss.

4 SIZE OF SCHOOLS

The TEND Inquiry into Tasmanian primary and secondary education has been discussed in some detail in this report, particularly concerning its recommendations about desired school size. It may be recalled that a high school of about 400 pupils was seen as "the most productive of teacher and pupil satisfaction, community involvement, and the economic and effective deployment of educational services"⁷. Despite the present fall in secondary enrolments, to achieve such a school size would require many additional resources - including approximately 100 additional high school teachers.

A reduction in high school size may also have implications for the deployment and use of teachers, especially concerning subject specialisation. Accordingly, for each of the years 1978-1980, the 28 high schools in the sub-sample were categorized into four groups Q1-Q4, according to size of pupil enrolment. As an indication of the size of schools in each category: in 1980 the average enrolment of schools in category Q1 was 800 pupils; in category Q2, 692 pupils; in category Q3, 556 pupils; and in category Q4, 453 pupils. Average enrolments in the previous two years were slightly higher.

Over the period 1978-1980, there was a limited movement of schools between the four categories, according to fluctuations in school enrolments - usually no more than one or two schools per category.

Table 4.20 compares the four categories of schools in regard to pupil-teacher ratio, average teacher loading, and average class size, 1978-1980.

A consistent feature of the table, is the relatively low pupil-teacher ratios enjoyed by the smaller schools. For the first two years of analysis, the staffing differences are higher than could

TABLE 4.20: PUPIL-TEACHER RATIOS, AVERAGE TEACHER LOADINGS AND AVERAGE CLASS SIZES IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980 - ACCORDING TO SIZE OF SCHOOL.

Teaching conditions:		1978	1979	1980
(a) pupil-teacher ratio				
	Q1	15.3	14.9	13.8
	Q2	14.9	14.2	13.1
	Q3	14.8	13.6	13.2
	Q4	13.9	13.3	12.8
	Total	14.7	14.0	13.2
(b) average teacher load				
	Q1	69.4	69.3	68.8
	Q2	67.9	67.6	66.0
	Q3	68.3	66.4	66.9
	Q4	70.4	68.0	68.0
	Total	69.0	67.8	67.4
(c) average class size				
	Q1	22.5	22.3	20.3
	Q2	22.4	21.3	21.0
	Q3	21.6	20.5	20.4
	Q4	20.2	21.4	19.8
	Total	21.8	21.4	20.4

Source: based upon principals' annual staffing returns.

Notes:

a.The categories Q1-Q4 denote size of school enrolment, such that Q1 represents the seven largest schools in a given year, and Q4 the seven smallest schools.

b.Each 'total' value is the mean of Q1-Q4 values.

c.Teaching load expressed as a percentage of the school cycle.

be explained, purely in terms of the secondary schools staffing formula. Different frequencies of part-time staff and/or different entitlements to supplementary staff may have been responsible. It may also have been that the smaller schools were more susceptible to the fall in secondary enrolments - with the consequent reduction in staffing numbers frequently being deferred, either wholly or in part. Whatever the causes, by 1980, pupil-teacher ratio differences were generally in accordance with the staffing formula.

Not unexpectedly, in all but two instances, class size returned the same relationship with size of school as did the pupil-teacher ratio.

In reference to the smaller schools, class size and pupil-teacher ratio may best be explanatively[?] linked as follows. Given prevailing educational practices, a school lesson commonly refers to the one group of pupils in the same year of secondary schooling, receiving instruction from one teacher (or teaching team) in one specified subject area. Considering the diversity of curriculum options offered by high schools, the inevitable consequence is that the smaller the school, the smaller the average class size. Hence the need for additional staff, and hence a relatively low pupil-teacher ratio in smaller schools.

In the light of this causative chain, it follows that different instructional practices could at least partly obviate the need for smaller schools to allocated higher staffing resources. Provision of teaching aids and aides could allow smaller classes to be combined - even to the extent of classes being taught in different subjects, under the one teacher. In smaller schools, subject classes could be constructed on an 'across-the-school' basis, rather than by maintaining the customary yearly divisions. The introduction or more widespread use of such practices, might well make the school-size reductions advocated by the TEND Committee, more feasible in a staffing context.

Table 4.20 fails to show a stable relationship between size of school and teacher loadings. However it does show that improvement in each category's pupil-teacher ratio 1978-1980, was sufficient to allow a consistent reduction in both average class size and, to a lesser extent, in teacher loadings across the three years.

The subject specialist demand methodology developed in the report, assumes that any possible change in school size will not affect the different demand levels per speciality. Using the same four categories of school size Q1-Q4 as in the previous table, Table 4.21 shows for each category, the proportions of the respective teaching forces per subject area, 1978-1980.

Differences in the proportions of teachers per subject, are invariably slight and bear no discernible relationship to size of school. In other words, at least as indicated by the period 1978-1980, larger high schools require very much the same levels of subject specialists, as do the smaller schools.

Size of school might however, influence the extent to which teachers are enabled to specialise in teaching one or more chosen subjects. Using number of subjects taught each year as an index of specialisation, Table 4.22 compares the four categories of school sizes.

The proposition that the smaller the school, the more reduced the extent of specialisation allowed, has already had limited confirmation, from the comparison of district high school staff with high school staff, in Table 4.2. A similar finding may be obtained from Table 4.22. The association was most consistent in 1980, when for categories Q1-Q4, the proportions of teachers active in three or more subjects were 15%, 16%, 17% and 21%, respectively.

In regard to both Table 4.2 and Table 4.22, it thus seems that size of school does affect the extent of specialisation allowed - as

TABLE 4.22: PROPORTIONS OF TEACHERS PER NUMBER OF SUBJECTS TAUGHT IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980 - ACCORDING TO SIZE OF SCHOOL.

Subjects taught	Proportions of teachers														
	1978					1979					1980				
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
0 subjects	1	1	1	0	1	1	0	0	1	1	0	1	0	0	1
1 subject	50	50	43	44	47	45	43	45	46	45	43	45	44	37	43
2 subjects	37	42	46	36	40	40	42	42	36	40	42	38	39	40	40
3 subjects	11	5	8	17	10	13	15	12	15	14	13	14	14	15	14
4 subjects	1	1	2	3	2	1	0	1	2	1	2	2	3	6	3
4+ subjects	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: based upon principals' annual staffing returns and Research Branch enrolment data.

Notes:

- a. The categories Q1-Q4 denote size of school enrolment, such that Q1 represents the seven largest schools in a given year, and Q4 the seven smallest.
- b. Any discrepancy between totals and constituent scores due to rounding.

TABLE 4.21: PROPORTIONS OF TEACHERS PER SUBJECT IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978, 1979 AND 1980 - ACCORDING TO SIZE OF SCHOOL.

Subjects	Proportions of teachers														
	1978					1979					1980				
	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4	Total
English	14	14	14	17	15	14	15	15	14	15	14	15	15	15	15
Social Science	10	12	11	11	11	11	10	11	11	11	10	11	11	11	11
Mathematics	13	12	13	13	13	11	12	13	12	12	12	11	12	13	12
Science	11	11	12	11	11	11	10	11	11	11	11	10	11	11	11
Physical Education	6	7	6	7	6	7	6	6	6	6	7	7	7	7	7
Manual Arts	12	11	12	13	12	12	11	12	13	12	11	11	10	12	11
Home Economics	7	8	7	8	8	7	6	8	8	7	7	7	9	8	8
Commerce	6	7	5	4	6	5	6	5	5	5	5	6	5	5	5
Art	6	7	7	6	7	6	7	6	7	6	6	6	6	6	6
Music	4	5	4	4	4	4	5	4	4	4	4	4	4	4	4
French	3	3	2	2	3	2	3	2	2	2	2	2	2	2	2
German	1	1	1	0	1	2	0	1	1	1	1	1	1	1	1
Miscellaneous	7	3	7	3	5	7	9	6	6	7	9	7	7	7	8
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: based upon principals' annual staffing returns and Research Branch enrolment data.

Notes:

- a. The categories Q1-Q4 denote size of school enrolment, such that Q1 represents the seven largest schools in a given year, and Q4 the seven smallest.
- b. Each 'Total' value is the mean of Q1-Q4 values.
- c. Any discrepancy between totals and constituent scores due to rounding.

measured by the number of subjects taught per teacher in a given year. Also in both instances, support, albeit more tentative, was found for the possibility that subject specialisation generally deteriorated over the three years, possibly as a result of an imbalance in the supply and demand of subject specialists.

Neither aspect however is to be over-emphasized: by 1980, well over three-quarters of teachers in all categories of school size taught in no more than two subjects. Any link between deterioration of subject specialisation and supply and demand imbalance, remains circumstantial only.

5 PUPIL-PERIODS

The methodology developed to estimate future demand for subject specialists, has entailed a projection of the actual teacher situation in Tasmanian secondary schools, 1978-1980. Although this appears justified in the short term by the stability of the underlying data-bases, from a longer term view, it risks the danger of becoming a rigid and static approach. Although the methodology allows planning officers to respond to any reported imbalance of particular subject specialists, the restricted information currently available requires that alterations occur without systematic knowledge of the full range of consequent implications, or even of precedent conditions.

A decision to allow the recruitment of additional Music teachers for example, may be caused by the need to allocate more teaching periods. In turn, this may reflect: the need to reduce class sizes and/or teacher loadings; the need to cope with expected enrolment fluctuations; and/or the need to compensate for past shortages. Existing information-feedback mechanisms between planning officers and school personnel are too inadequate, present data-bases too restricted, to allow a specific assessment of the consequent impact of additional Music specialists. Neither is it possible to assess with confidence which subjects, and to what extent, and on what basis, can best afford the resultant relative reductions in teacher numbers.

Secondly, the data-bases built in this chapter, particularly for the high school sub-sample, have established that the 1978-1980 improvement in the pupil-teacher ratio was accompanied by improved teaching and classroom conditions. The present state of the Department's teacher planning, however, means that the exact nature, and the magnitude, of such improvements can be only broadly assessed.

The subject specialist demand methodology, by virtue of its projection of an actual situation, finds it cumbersome to measure, or

to respond to changes arising for example, from improved staffing standards. It is hence forced to assume: either that improvements in teacher loadings or class size will be equally distributed across all subjects; or, that differential rates of improvement will not influence future demand levels per subject.

The data-bases discussed to this point, if maintained, should assist in developing a more comprehensive approach to secondary teacher planning. It is however, argued that there needs also be developed a further index of teacher need, to allow at least some of the above limitations and difficulties to be resolved.

The concept of pupil-periods is postulated as such an index, whereby teacher need across subjects may be compared by a joint consideration of two aspects. These are:

- (i) pupil enrolment levels in each subject;
- (ii) the amount of instruction received in each subject, measured by the average number of subject periods in a school cycle.

Table 4.23 shows for the sub-sample of high schools 1978-1980, subject pupil enrolments, expressed as a proportion of all pupils enrolled in the 28 schools. (The incomplete enrolment statistics with regard to the minor curriculum options, previously mentioned, also pertain to this table.)

"Given the rate at which the preference of students for particular subjects ... has changed in the past, it is difficult to make reliable predictions (about demand for subject specialists) over the longer term."⁸

This comment made by the AEC Working Party, appears largely inappropriate to Tasmanian high schools over the three-year period. The biggest change in enrolment levels was the increase in the number of Miscellaneous enrolments 1978-1979 - an issue already discussed with regard to subject teacher patterns.

In most other instances, the enrolments displayed a level of

TABLE 4.23: PUPIL ENROLMENTS PER SUBJECT
EXPRESSED AS A PROPORTION OF ALL PUPILS
ENROLLED IN THE SUB-SAMPLE OF HIGH SCHOOLS
IN THE TASMANIAN DEPARTMENT OF EDUCATION,
1978, 1979 AND 1980.

Subjects	Enrolments		
	1978	1979	1980
English	1.32	1.35	1.41
Social Science	1.02	1.00	1.00
Mathematics	1.08	1.11	1.07
Science	1.02	1.03	1.03
Physical Education	1.05	1.18	1.09
Manual Arts	1.20	1.22	1.18
Home Economics	0.68	0.70	0.72
Commerce	0.56	0.57	0.52
Art	0.64	0.66	0.66
Music	0.48	0.53	0.55
French	0.28	0.25	0.25
German	0.10	0.09	0.08
Miscellaneous	0.05	0.16	0.17
Total pupil enrolment	19055	18412	17513

Source: based upon principals' annual enrolment returns.

stability broadly comparable with that of subject teacher trends. Apart from the Miscellaneous category, subject enrolments from one year to the next, fluctuated by more than 0.05% of the total pupil enrolment, in only two instances. Changes of this magnitude, when expressed in terms of actual pupil numbers, appear quite substantial. However the very small shifts in average class size required to accommodate such variation, reduced most fluctuations to manageable proportions.

The second component in the calculation of pupil-periods, is the average number of periods in the school cycle given to each subject. This information, standardized to represent a thirty-period cycle, is presented in Table 4.24. (In 1979, fifteen school principals returned the appropriate information; in 1980, twenty-one returns were received. Accordingly, the consequent information is best viewed as indicative only.)

It is stressed that the average number of periods of instruction per subject, relates to all pupils attending school, rather than the number of pupils enrolled in that subject. For the four major subjects and for Physical Education, the two sets of pupils were close to identical. For each of the optional subjects, however, the average number of periods shown in the table, sizeably understate the amount of instruction received by those pupils actually enrolled in the subject.

The number of pupil-periods in each subject, is the product of subject pupil enrolments and the number of subject periods. The numbers of pupil-periods per subject in the selection of high schools 1979-1980, are presented in Table 4.25.

The concept entails that overall, each pupil in a thirty-period cycle is equivalent to thirty pupil-periods. Considering the combined high school enrolment each year relative to the total number of pupil-periods, each pupil was equivalent to 28.78 and 28.74

TABLE 4.24: PERIODS PER SUBJECT IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1979 AND 1980.

Subjects	Periods			
	1979		1980	
	No.	%	No.	%
English	4.8	16.0	4.9	16.3
Social Science	3.9	13.0	3.8	12.6
Mathematics	4.2	14.0	4.1	13.7
Science	3.8	12.7	3.9	12.9
Physical Education	2.0	6.7	2.1	7.1
Manual Arts	2.7	9.0	2.7	8.9
Home Economics	1.9	6.3	1.8	6.1
Commerce	1.6	5.3	1.4	4.8
Art	1.4	4.7	1.5	4.9
Music	1.1	3.7	1.2	4.0
French	0.8	2.7	0.7	2.3
German	0.4	1.3	0.4	1.2
Miscellaneous	1.5	5.0	1.6	5.3
Total	30.0	100.0	30.0	100.0

Source: based upon principals' annual time-table returns.

Notes:

a. Insufficient 1978 data available to warrant analysis.

b. Standardized to represent a 30-period cycle.

TABLE 4.25: PUPIL-PERIODS AND FULL-TIME EQUIVALENT TEACHER NUMBERS PER SUBJECT IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1979 AND 1980.

Subjects	1979			1980		
	Pupil- periods ('000)	Teachers loading	Average loading	Pupil- periods ('000)	Teachers loading	Average loading
English	119.3	189	631	121.0	196	617
Social Science	71.8	141	509	66.5	141	472
Mathematics	85.8	157	547	76.8	154	499
Science	72.1	142	508	70.3	145	485
Physical Educ.	43.5	83	524	40.1	90	446
Manual Arts	60.6	153	396	55.8	145	385
Home Economics	24.5	95	258	22.7	102	223
Commerce	16.8	70	240	12.7	67	190
Art	17.0	83	205	17.3	79	219
Music	10.7	56	191	11.6	58	200
French	3.7	28	132	3.1	29	107
German	0.7	13	54	0.6	13	46
Miscellaneous	3.4	97	35	4.8	100	48
Total	529.9	1307	405	503.3	1319	382

Source: based upon principals' annual staffing, enrolment and time-table returns.

Notes:

- a. Insufficient 1978 data to warrant analysis.
- b. Standardized to represent a 30-period cycle.

pupil-periods in 1979 and 1980, respectively. As the 4.1% shortfall is largely attributable to the incomplete enrolment data previously specified, the statistics in the Miscellaneous category in particular need to be regarded with caution.

The number of subject pupil-periods is not in itself, an index of required staffing resources. For example, in 1980, enrolment and curriculum factors in the high school selection meant 121,000 pupil-periods to be managed by English teachers per week - compared with 12,700 pupil-periods for Commerce teachers. Were pupil-period loadings constant across subjects, the full-time equivalent number of Commerce teachers required, would have been one-tenth the number of English teachers.

It may be seen from Table 4.25 that this was not the case. In practice, English teachers were required to handle about triple the number of pupil-periods managed by Commerce teachers. Similar differences in pupil-period loads existed for other subjects, with the extent of difference being fairly constant across the two years.

In this regard, English teachers had the heaviest loading - followed by Social Science, Mathematics, Science, and Physical Education teachers, each with around 80% the loading of English teachers. Manual Arts teachers were isolated with a 65% loading, and were followed by Home Economics, Commerce, Art and Music teachers, each with around one-third the loading of English teachers.

The nature of the allocation of teaching duties within high schools, makes it unlikely that a shortage or excess of particular subject specialists caused loading differences. They are more likely to be due to fluctuations in subject enrolment levels and consequent subject class sizes.

It is argued that having due regard to the varying classroom demands across subjects - reflected in the different types of

activities, different modes of teaching, different needs for individualized attention, different class sizes that can be adequately managed, etc. - each subject teacher has an optimum average number of pupil-periods. This number may be considered either in absolute terms, or relative to the total available staffing resources for a given year.

To be a meaningful index of staffing needs, the number of pupil-periods in a subject needs to be considered in conjunction with some measure (actual, expected, desired, etc.) of pupil-period loadings. The actual average pupil-period loadings per subject in the selection of high schools 1979-1980, are also shown in Table 4.25.

As outlined in the foregoing discussion, pupil-periods appear similar to pupil-contacts - where the latter are based jointly upon the number of classes held by each teacher in a school cycle, and the number of pupils in those classes. There are however, two critical differences between the two concepts:

- (i) pupil-periods have as their focus, the whole range of subjects in a school curriculum; pupil-contacts, used in the context of demand planning, centre separately upon each category of subject teacher;
- (ii) pupil-periods relate to the various subjects' staffing needs; pupil-contacts measure the teaching conditions within each subject.

An analysis of pupil-periods produces a synchronized view of the total curriculum - and thus, of the total secondary teaching force. For example, any variation in the number of pupil-periods in a particular subject, either through enrolment changes or through a change in the number of periods to be taught in that subject, necessitates commensurate changes in one or more other subjects. On the other hand, any change in pupil-contacts and thus in teaching conditions, in a given subject, does not necessarily have implications for other subjects.

It is suggested that the notion of pupil-periods has numerous

uses within an educational context. As a specific example, it has an obvious relevance to the staffing and resources study presently being undertaken by the Australian Council of Educational Research, commissioned by the AEC⁹.

Two other uses have been outlined in the statement of aims at the beginning of Chapter 3.

First, the additional staffing resources arising from an improved pupil-teacher ratio, may be directly channelled into subject areas in most need. That almost all subjects have benefited from improvements in the pupil-teacher ratio 1978-1980, has already been indicated. (Further evidence is the reduction in pupil-period loadings in almost all subjects 1979-1980, as shown in Table 4.25.) In such instances however, individual subjects' teacher needs have been considered only at the broadest levels. Given the facility to make precise comparisons in this respect, desired alterations in loadings may be systematically planned.

The above discussion assumes the availability of appropriate recruits - an issue which leads to the second use of pupil-periods. If teacher planners have developed a knowledge of teachers' average pupil-period loadings per subject, and have also made assumptions about future general staffing levels, it becomes possible to develop an alternative teacher demand planning methodology. This methodology would ensure not only that staffing resources may be distributed to subject areas of greatest need - but would yield subject-specific recruitment estimates which could be fed into a supply planning model.

Compared with the Department's present demand model and the complementary subject specialist demand methodology developed in the report, it seems that there are two major practical advantages to the pupil-period planning approach:

(i) the facility to compare subjects' relative staffing needs, as has been discussed;

(ii) the more general advantage of overall flexibility in teacher planning.

As an example of this flexibility, the following problem may be considered. There is a constant pressure upon schools to change the nature of the curriculum options offered: a specific example is the alleged need for pupils to have a wider comprehension of social law and associated issues. If a new subject called Legal Studies was introduced into the junior secondary curriculum, the pupil-period approach would be able to make a detailed assessment of the consequent impact upon subject specialist demand levels.

Quantitative answers to the following issues would need to be sought:

- (i) the number of pupils each year, likely to be enrolled in the new subject;
- (ii) the number of periods in the school cycle, the new subject would occupy;
- (iii) the pupil-period loading required of a Legal Studies teacher;
- (iv) from what other subjects, and to what extent, would Legal Studies pupils be drawn;
- (v) what other subjects, and to what extent, would consequently have a reduced number of periods per cycle.

Precise answers to most of these issues could be derived from timetabling and other information relating to the new subject. Where some answers might be more tentative, the approach has the capacity to evaluate and if necessary, modify its initial assumptions.

The advantage of flexibility is also exemplified by the capacity to monitor on an ongoing basis, the supply and demand of various subject specialists. Once actual subject teacher loadings over a period of years have been established as a data-base, any imbalance between supply and demand will be readily reflected in the most recent loading statistics.

The constituent data-bases may then be searched, possibly to locate the source of imbalance - i.e. whether enrolment levels have altered; or whether there has been a change in the number of periods given to the teaching of the subject. The extent of remedial action may then be calculated - either by planning for a return to past loading levels, or by planning for an alternative level.

The flexibility required in the above two examples, is beyond the capacity of the subject specialist demand methodology, earlier outlined.

An apparent disadvantage of the pupil-period methodology, is the amount of statistical activity required to establish and maintain the underlying data-bases. The Department's present demand model requires only two basic sets of information - projected secondary enrolments, and assumed total staffing standards. The complementary subject specialist methodology further requires a record of past full-time equivalent numbers of subject teachers. What is now also being required is a detailed analysis of the subject enrolment and curriculum structures of individual secondary schools.

Nor should this be all. Pupil-periods do not directly relate to a specific condition or set of conditions within a classroom context. Merely to assume that lowering the average pupil-period loading of teachers in a given subject, will lead to improved classroom, teaching and learning conditions, is to perpetuate the same mistake that has been made with regard to the pupil-teacher ratio. Regardless of which of the two concepts may be favoured, at the very least, extensive statistics need to be collected if the significance of staffing improvements is to be assessed.

It is judged that the various advantages provided by the pupil-period approach to teacher planning, amply justify its further development. To dismiss it because of the amount of statistical analysis it requires, is to settle for a more rudimentary form of

teacher planning, capable of operating only upon the broadest aspects of a school system.

FOOTNOTES

- ¹ based upon Personnel Office leave schedules, etc.
- ² For example, in the Department's planning calculations.
- ³ See previous discussion in Chapter 1.
- ⁴ Secondary Education in Tasmania.
- ⁵ Education Department of Tasmania, Research Branch, Teacher Education: Estimate of Required Recruitment to Departmental Studentships 1979-1987.
- ⁶ Ibid.
- ⁷ Tasmania Education: Next Decade, p45.
- ⁸ The Supply of and Demand for Teachers in Australian Primary and Secondary Schools 1978-1985, p84.
- ⁹ The working title for the study is: 'The study of staff and resources for Government schools in Australia and New Zealand'.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

1 SUMMARY AND CONCLUSIONS

In the introduction to the report, it was argued that the usefulness of teacher supply and demand forecasts would be appreciably increased, if the forecasts could be expanded to consider teachers as subject specialists. (Subject specialisation in the secondary sector was defined as the tendency for teachers to be active commonly in one or two subjects only, and for those subjects to be largely unchanged year to year.) It was also argued that because demand forecasts invariably used the pupil-teacher ratio as the sole index of the state of a given school system, the consequent forecasts were insensitive to a range of policy variables and possible educational changes.

Using the Tasmanian State Education Department as the target of investigation, two general aims were formulated. These were:

- (i) to develop a statistical basis and appropriate mechanisms, to allow the current supply and demand planning model used by the Department to take a detailed account of the subject specialities of secondary school teachers; and
- (ii) to assess the state of a select range of school and educational conditions and, where appropriate, to take into consideration in a supply and demand context, possible changes in these considerations.

In fulfillment of these aims, the main body of the report contained three major themes:

- (i) a review of the literature to provide a general context for

Australian teacher supply and demand developments;

(ii) the development of a subject specialist teacher supply and demand planning methodology; and

(iii) the investigation of a select range of school and educational aspects of possible relevance to teacher planning.

(A) Teacher supply and demand in Australia.

Following a brief sketch of the history of teacher forecasting in Australia, an early focus of the report was the range of demographic and social factors which underly the present and projected teacher surplus in this country.

Foremost amongst these factors is the so-called 'baby boom', characterising the period stretching from the late 1930's to the early 1960's - during which years, the national birth level more than doubled. Despite the fall in fertility rates during the 1960's, conventionally interpreted as signalling the end of the baby boom, birth numbers continued to increase until 1971 - from which point, they had declined by 20% by 1978.

It was concluded that the baby boom, in conjunction with other factors, will ultimately have a three-fold impact upon teacher supply and demand.

The first impact was upon the primary and secondary pupil enrolment, which over the last twenty years has averaged a 2.5% annual growth rate. Also because of a general pressure to improve, rather than merely maintain staffing standards, the national teacher establishment has also grown - for the same period of time, at an average annual rate of 5%.

The second impact of the baby boom was directly upon the teaching force itself. As its products percolated through the school and

tertiary education systems, in unprecedented numbers and at unprecedented rates, the number of graduates available for recruitment to the teaching profession grew commensurately. Given the later fall in birth rates, this has meant a teacher pool of such size that many seemingly, will be unable to work in their chosen field.

The third impact, yet to be made, concerns the number of baby boom children themselves coming into parenthood. It appears that the age-structure of the Australian population is such that from the early 1980's onwards, the primary-secondary enrolment will expand by approximately 1% per annum as a result of this factor alone. Notwithstanding this recovery, it has been generally accepted that the prevailing low teacher wastage levels and the possibility of a continued decline in staffing improvements, will lead to a worsening surplus situation, if left unchecked.

It was thus stressed that demographic factors were not solely responsible for the projected teacher surplus. To demonstrate this, the AEC Working Party calculations were reworked - assuming various staffing standards, assuming a continued enrolment expansion and/or assuming different wastage and supply parameters. All three sets of factors emerged as generally equal partners in the projected supply and demand imbalance.

The report then proceeded to detail the type of model commonly used in teacher forecasting exercises. The specific model used by the AEC Working Party was selected for detailed consideration, although reference was made also to the Tertiary Education Commission and Tasmanian Department of Education models. Despite one major difference in a supply context, the three models were viewed as of the same general type.

It was concluded that the validity and usefulness of supply and demand projections so yielded, were restricted by two general considerations.

First, the numerous untested statistical assumptions and uncertainties fed into the model. A number of potential sources of error in this regard were instanced - with one of the more serious examples being the AEC estimates of the number of teacher applicants from 'other sources'. It was calculated that had these estimates been in accordance with data from some State systems, the 20-40% surplus projected by the Working Party, would have been either halved (assuming constant staffing standards) or totally removed (assuming improved staffing standards).

The second general factor restricting the usefulness of this type of model, was the limited scope of the consequent estimates. Casual relief teachers and professional support staff were commonly excluded from consideration, despite being areas of teacher employment. Supply and demand estimates also largely failed to consider teachers as specialists - an aspect of particular importance to the secondary sector, where an overall shortage or surplus, by no means necessarily relates to the state of balance in individual subjects.

Having indicated the major sources of potential error pertinent to the AEC type of forecasting model, the next task of the report was to describe some applications of the model and to assess their accuracy.

A series of forecasts relating to teacher numbers in England and Wales from the 1960's onwards, illustrated the magnitude of error which could beset forecasts as a consequence of change in demographic and other variables. The two early Australian studies cited, reinforced the uncertainty of teacher forecasting - in both cases, errors in the underlying assumptions being of sufficient magnitude to counter the extent of surplus predicted by the AEC Working Party. The AEC forecasts were also studied, albeit over a very restricted projection span. The major error which could be discerned at this early stage, was the over-estimation of teacher wastage, which at 7% in 1978 was well below the projected level of 9.5%.

From this background, the report proceeded to a broader appraisal of quantitative teacher forecasting.

An early point of discussion was the need to consider a range of non-quantitative aspects. A counter-argument to quantitative planning, from a 'resource policy' point of view, was presented, whereby there was seen the need to transcend the rigidities allegedly characteristic of such as the AEC approach, to examine in full the needs and concerns of educational systems. Without necessarily accepting the full implications of this view, it was concluded that certainly at some point in planning, non-quantitative aspects need to be assessed. Specific aspects, commonly ignored, include the improvement of teacher-applicant selection techniques and the efficacy of various staffing patterns within schools.

Discussion then moved into a quantitative context, centring initially upon the validity of the pupil-teacher ratio as a planning and forecasting concept. Its development intended that the ratio should act as an index of class sizes within a school system - a capacity which has been very strongly questioned by both critics and proponents of quantitative planning, alike. Following an outline of the major points of contention in this regard, further discussion was deferred until a later chapter in the report, following the investigation of the Tasmanian situation.

Three principal components of the type of forecasting model previously detailed, were then selected for analysis. The components - pupil-teacher ratio projections, wastage projections and the projection of graduation levels from pre-service training courses - were selected, partly because they customarily bear the brunt of the forecasting burden, partly because of the sizeable difficulties associated with their projection.

With regard to the pupil-teacher ratio, it seemed that particularly government funding decisions have in the past, caused

target staffing standards to be either deferred or totally abandoned. Wastage projections, generally recognized as the most unpredictable element in the supply and demand equation, are determined by the interaction of a complex assortment of economic, vocational and personal variables. It was concluded that the difficulties incurred in the projection of teacher graduation rates, were only partly solved by the use of quota systems - with numerous writers stressing the need to recognize the influence of market forces upon pre-service enrolments. For all three components, specific examples were given of projections gone awry, due to unexpected changes or miscalculations in these areas.

An overview of teacher forecasting in Australia was then presented. It was concluded that despite the associated uncertainties and potential for error, formal forecasting remained a justifiable endeavour. By providing a reasonably systematic approach and by being at least partly open to ongoing testing and if necessary, modification, the AEC model and its various equivalents were judged the most acceptable basis for those planning decisions needing to be made in a teacher supply and demand context.

The model used by the Tasmanian Department of Education was consequently accepted as the specific framework within which a subject supply and demand methodology was to be developed. It was intended that this development would also be relevant to the AEC Working Party and Tertiary Education Commission models.

(B) Supply and demand of subject specialists.

The second major phase of the report concerned the development of a supply and demand planning methodology, capable of recognizing secondary teachers in the Tasmanian Department of Education as subject specialists. As a preliminary to the development of this methodology, and also as a preliminary to the third phase of the report, it was

necessary to analyse in some detail the secondary education sector of the Department - including a consideration of policies and practices of influence upon supply and demand planning.

Much of the analysis was of a descriptive nature - detailing the types of secondary schools, categories of staff, growth and wastage trends over the past fifteen years, etc. Where major points of difference were found, compared with other States' systems - e.g. aspects of rural education; the establishment of separate colleges at a senior secondary level - detailed explanations were provided.

From a planning point of view, the Department's continued provision of a studentship training scheme was of special interest. In the introduction to the report, it was argued that efficient teacher planning required both in the initial selection of trainees and in the counselling services provided during their training, required that system teacher recruitment needs in each specialist area be anticipated. Following a review of studentship selection techniques, it was concluded that until most recently, secondary trainees' intended fields of specialisation were of negligible influence upon selection - a practice partly attributed to lack of adequate data in this regard. Past selection practices and consequent pre-service enrolment patterns were seen as contributing directly to existing imbalances of certain categories of subject specialists. (It was found that from 1979 onwards, the Department's future staffing needs were given more prominence - but still largely in the absence of appropriate, systematic information.)

Also in the introduction, reference was made to the 'stocktaking' of personnel resources made by most educational systems, usually towards the end of a school year, in order that the allocation of staff for the following year may be planned. Because this exercise needs be pitched ultimately at the level of each subject area within each secondary school it was argued that detailed knowledge of subject specialisation patterns would greatly facilitate the process of

allocation.

A consideration of the secondary staffing allocation procedures used in the Department, confirmed this view. The regional structure of educational administration has meant that whilst school principals are able to channel their specialist staffing requirements into the decision-making process, their input is rarely quantified at any meaningful level and does not directly reach those officers responsible for pre-service and teacher selection. The consequence is that Studentship and Personnel officers are frequently able to act only on the basis of fairly informal, often dated, information. The process of allocation appears further hampered by the near-total absence of reliable statistics pertaining to such factors as the numbers of subject specialists within the system and the prevalent combinations of subject specialities.

Background information about the Tasmanian Department of Education, was followed by a description of the research design used in the report.

The formulation of a series of specific aims, constituted the first part of the research design. In addition to the more general aim of developing a subject specialist supply and demand planning methodology, other major aims relevant to the second phase of the report were:

- (i) to identify the extent to which secondary teacher subject specialisation occurred in the Tasmanian Department of Education, and to determine whether changes in this extent occurred over the period of analysis;
- (ii) to analyse teacher recruitment patterns from a subject specialist viewpoint - particularly, to test the relationship between pre-service training specialities and nature of teaching duties upon placement in a school;
- (iii) to compare the different approaches which might be used to quantify various features of subject specialisation, found in the

Tasmanian secondary school system.

The sample of secondary schools used as the focus for investigation, was then described. The sample was drawn from district high schools, high schools, and matriculation colleges - and represented some 80% of all secondary State school teachers and pupils, in each year of analysis.

The nature of data collection was also outlined - with the major data source being the staffing and enrolment returns prepared by each secondary principal at the beginning of a school year. Data from other specified sources were also collected for each of the years, 1978, 1979, and 1980.

Aspects of the proposed data analysis were then detailed.

It was explained, for example, that subject specialist demand statistics were to be calculated in full-time equivalent terms, based upon information in annual staffing returns. The total number of periods allocated to the teaching of each subject in a given school's timetable cycle, expressed as a ratio of the average number of periods taught by all teachers in the cycle, was regarded as equivalent to full-time teacher demand in that subject, in that school. By carrying out such an analysis for each school in the sample, and by combining the results from all schools, it was possible to quantify total secondary subject specialist demand for each of the years 1978-1980. These data were to be projected over future years, in conjunction with general estimates derived from the Department's teacher planning model, to yield subject-specific demand estimates.

Proposed data analyses for other aspects of relevance to this second phase of the report, including the preparation of subject wastage projections, were also detailed.

This summary of the second major phase of the report, is

completed by a consideration of the results obtained from the sample of schools, over the three years of analysis.

(i) extent of subject specialisation

An early finding was that subject specialisation was indeed practised by secondary teachers in the Department. An analysis of loads of some 1700 teachers per year, revealed that approximately 85% of teachers were active in a maximum of two subjects in each year - and that for the balance, the extent of involvement in the third or perhaps fourth subject, was very limited. The second dimension of subject specialisation - the extent to which subjects taught, varied across the years - was studied by means of a randomly-selected sample of 137 high school teachers. It was found that the acquisition of new subjects from one year to the next, affected only 20-30% of teachers annually - with the new subject commitments for these teachers being restricted to approximately 25% of their loading.

This joint finding was taken to constitute a major practical justification for the development of a systematic approach to subject specialist supply and demand planning.

(ii) teacher demand

A central set of results related to the analysis of each year's secondary teaching force into full-time equivalent teacher numbers per subject. It emerged that the four traditional subjects - English, Social Science, Mathematics and Science - together accounted for around 50% of all teachers. The technical subjects - Manual Arts, Home Economics, and Commerce - accounted for a further 20%, with the balance being distributed amongst the minor subjects.

A feature of considerable importance to the preparation of subject demand projections, was the high stability of teacher levels

per subject across the three years. For the total secondary sample, for any subject, the extent of fluctuation in staffing levels from one year to the next, was equivalent to a maximum of eight or so teachers. (The one exception to this stability, was the growth of teachers in the Miscellaneous category - a feature which was traced to staffing policy and curricula changes, affecting particularly the 1979 high school teaching force.)

Because of this stability, it was concluded that the consequent subject demand methodology, based upon the projection of the above statistics, could be used, at least in the short term, without causing additional significant errors to beset teacher forecasts.

(iii) teacher loss

A different situation was found in regard to subject wastage trends, evident in 1978 and 1979. Against a background of declining wastage, it emerged that subjects' actual loss rates through resignations, were capable of wide variation year to year. Music teachers were given as a specific example: in 1978, the loss rate was 16.7% and in 1979, had fallen to a low 2.1%. For the combined two-year period, however, a more stable set of results were obtained - in that the extent of actual loss per subject, related reasonably closely to the size of each subject's teaching force.

It was accordingly stressed that the several uncertainties entailed in the projection of general wastage rates, thus risked being compounded by this further refinement into loss per subject area. The development of more extensive data-bases in this context, was seen as a means to remove a limited portion of uncertainty.

(iv) teacher supply and demand per subject

The findings summarised to this point, in conjunction with the general estimates provided by the Tasmanian Department of Education's

teacher planning model, have enabled supply and demand estimates to be pitched at the level of each subject category. An example of this expanded methodology at work for the year 1981, has been given in the main body of the report, in Figures 4.1 and 4.3.

(v) teacher recruitment

Departmental recruitment activities 1978-1980, were examined - both to provide a limited context within which subject recruitment projections may be placed, and to test the relationship between pre-service training and the nature of teaching duties upon placement in schools.

With regard to the former purpose, a major finding was that, if subject recruitment levels persist unchecked, the prevailing supply and demand imbalance characterising several subject areas, will worsen over future years. Present recruitment trends seemed most at odds with the recruitment projections yielded by the expanded subject supply and demand model, in English, Social Science, Music and Commerce categories.

A study of studentship graduates appointed to high schools during the three years of analysis, revealed a close concurrence between nature of pre-service training and teaching duties. In each year, over three-quarters of studentship-graduate teachers were teaching exclusively in their fields of training - with the majority being active only within their 'major' training areas. For the remaining twenty to thirty teachers per year, on average, 20% of teaching load was in subjects outside of training.

However, as in some other areas of the report, there was limited evidence to suggest a growing imbalance in some specialist categories. In this specific instance: by 1980 there had occurred a marked shift in the proportion of studentship recruits who were able to teach only in their major training specialities - the proportion dropping from

71% in 1978 to 41% by 1980. Although about one-half of the 1980 recruits active in areas beyond their major training specialities, taught within their 'minor' specialities, almost one-third of that year's recruits were required to teach at least one subject beyond their training.

It was concluded that a more regulated and planned approach to recruitment and studentship intake, would be a means of arresting this possible trend.

The final problem undertaken in the second phase of the report, concerned the need to ensure that for each school year, schools were adequately staffed appropriate to their curricula offerings after taking account of teacher transfers, resignations and appointments.

Following an analysis of subject specialisation patterns in the sample of schools 1978-1980, a number of quantifiable generalisations were derived. These generalisations, either at a total secondary level or still with safety at a Regional level, would allow teacher planners to take the following steps, in the annual allocation process:

- (i) estimation of full-time equivalent teacher demand per subject;
- (ii) estimation of actual or 'head-count' number of teachers likely to be required for each subject;
- (iii) for about two-thirds of a teaching force, estimation of the number of available specialists per subject or select subject-combination, (where specialisation was defined in terms of previous teaching experience).

It was concluded that these facilities would provide a useful framework within which subject-specific planning activities could be carried out, particularly by establishing guidelines to the options available to planners.

(C) Select school and educational conditions.

In the third phase of the report, an investigation was made of select school and educational variables, to which forecasting models have customarily proven insensitive. Much of this investigation was restricted to the sub-sample of high schools in the Tasmanian Department of Education, 1978-1980, because of the small number of other schools and teachers.

The first point of concern was the relationship often claimed to exist between the pupil-teacher ratio and class sizes in a school system. Given the various points of contention which were found to emerge from the literature, an initial aim was to investigate pupil-teacher ratio and class size developments in the sub-sample of Tasmanian high schools, 1978-1980.

The review of Tasmanian secondary education, previously remarked upon, revealed several aspects which led to a further series of aims.

One such aspect was the 1977 Staffing Agreement, reached between representatives of the Department and the Tasmanian Teachers Federation. The Agreement specified certain expansions to the primary and secondary teaching forces 1978-1980, if a series of Federation teacher loading recommendations were to be achieved without entailing an enlargement of class sizes. It was noted that the increased teacher numbers had been translated into pupil-teacher ratio improvements for each of the three years, which were then incorporated within the Department's teacher planning model. As formulated in the research design, another early aim was to assess the extent to which the loading reductions had been achieved - and, to assess the continued impact any further achievement of loading reductions was likely to make upon teacher demand.

A second aspect revealed by the review, was the dramatic decline in teacher resignations over recent years. It was calculated that this decline had a number of fairly obvious implications for supply and demand planning: for example, by 1979, an extra 250 or so

secondary teachers were continuing in employment from one year to the next, who would have been expected to resign had the wastage levels of the late 1960's persisted. Also, it was concluded that the decline had a more covert influence - for example, producing a teaching force ageing at a more rapid rate than was previously the case, which in turn had implications for future retirement levels.

Again as formulated in the research design, a further aim was to examine the impact of the drop in resignations upon both future retirement levels and upon future incidence of entitlement to long service leave.

In the review, attention was given to an assortment of recommendations arising from two recent inquiries into Tasmanian education. A number of these recommendations focussed upon the issue of school size. With a view both to achieving maximum teacher and pupil satisfaction and to maintaining an economic deployment of staffing resources, one recommendation was that school enrolment limits of 300-500 pupils be accepted. Using the 1978 high school sub-sample situation as an example, it was calculated that this recommendation would mean, in addition to an extra thirteen high schools, at least a further 100 high school teachers.

Given the possibility of deliberate reductions in school size occurring over future years, it was considered that other aspects relevant to teacher supply and demand planning might also eventuate. As detailed in the research design, a number of subsidiary aims within this area were accordingly constructed:

- (i) to investigate the relationship between the Department's staffing allocation policies and consequent pupil-teacher ratio conditions in high schools of varying size, 1978-1980;
- (ii) to determine whether size of school affected the deployment of teachers across subject categories;
- (iii) to determine whether size of school also affected the extent to which teacher subject specialisation could be practised.

Another theme running through both inquiries into Tasmanian education, pertained to the possibility of wide-sweeping changes in secondary curricula. Both inquiries emphasized the desirability of continued development of various school-based curricula, particularly at the junior secondary level. Whilst a central body - be it the present Schools Board of Tasmania or an alternative structure - would continue to exercise some control over core elements of the curricula, it was commonly recommended that schools be encouraged to discard many of the prevailing curricula structures and restrictions, in pursuit of learning activities and experiences across existent disciplinary boundaries.

It was considered that it would be easy to exaggerate the impact of school-based curricula upon the spread and diversity of learning experiences. Notwithstanding, it seemed virtually inevitable that over future years, there will be many changes in the skills and knowledge required of teachers, should these recommendations be accepted.

The conclusion that the subject specialist demand planning methodology outlined in the second phase of the report, could be confidently used in the short-term future, has already been presented. The conclusion was based largely upon the stability of the underlying data-bases, as evidenced over the three years of analysis. From a longer-term viewpoint, however, the possibility of significant curricula changes poses problems for this methodology.

Accordingly, with a view to long-term projections, an alternative demand planning methodology has been constructed, intended to allow a more flexible and sensitive approach to curricula and other variables. As sketched in the research design, application of the methodology rests upon assumptions made about: projected subject enrolment levels; expected extent of learning exposure to each subject (measured in terms of periods per school cycle); and the consequent 'pupil-period' loadings of teachers in each subject.

The summary of this third phase of the report, is completed by considering the results obtained from the sample of schools 1978-1980.

(i) pupil-teacher ratio and average class size

With regard to the relationship between pupil-teacher ratio and class size, it was found that in the high school sub-sample over the period 1978-1980, average class size proved generally responsive to the improvement in staffing standards. The rates of change were not, however, equal. For the three years, the pupil-teacher ratio fell by 10.1%, compared with a 5.1% reduction in average class size.

Two main factors were considered responsible. Firstly, there occurred a reduction in teacher loadings, equivalent to the loss of 29 of the 135 additional teachers arising from improved staffing standards. Allowing for this factor, average class size fell at approximately two-thirds the rate of the pupil-teacher ratio. Secondly, many of the additional teachers were remedial specialists - who frequently operated on a near one-to-one basis with pupils, and who thus had limited influence upon class size statistics.

A general conclusion drawn in regard to this latter factor, was that the more restricted the availability of additional staff in terms of teaching duties, the greater the likely discrepancy between the improvement rates in the pupil-teacher ratio and in class size.

Not only the average class size was affected by changes in staffing standards. In looking at the overall distribution of class sizes in the sub-sample, it was noticed that almost all points in the distribution experienced some downwards shift over the three years - although the extent of shift proved differential. Further, when the average class sizes in each subject category were considered separately, a comparable finding was returned. In only two instances, subject class sizes failed to improve.

These findings were taken to constitute considerable support for the pupil-teacher ratio as a planning device - at least concerning its relationship with the class size variable.

(ii) teacher loadings

The second set of results concern the loadings of high school teachers in various promotional and non-promotional positions. When actual loadings 1978-1980 were compared with the loading recommendations made by the Tasmanian Teachers Federation, which underly the 1977 Staffing Agreement, considerable discrepancy was found. Although there was some extent of reduction from year to year, most markedly for teachers in non-promotional positions, it appeared that the bulk of reduction had yet to occur.

Based upon the 1980 situation, it was estimated that an extra 90 teachers would be required for the high school sub-sample, if the loading recommendations were to be achieved.

This finding pointed to a major limitation in using the pupil-teacher ratio as the sole forecasting device. Despite the rationale underlying the provision of many of the additional staff 1978-1980, a study only of pupil-teacher ratio movements would be unable to indicate that this rationale had not been translated into practice.

(iii) teacher characteristics

The third set of results related to select teacher characteristics, with the most significant finding in this area pertaining to projected teacher retirement rates. As a starting point, the age structure of the total 1978 high school teaching force was analysed, and projected to yield estimated retirement levels 1979-2003. It was estimated that, for as long as prevailing resignation and recruitment patterns permit, these projections could

be accepted.

The projections suggested that for the next decade, retirements will rise only slightly above present levels - but thereafter will increase abruptly, to triple the current rate by the turn of the century. It was concluded that a failure to consider this feature in supply planning, could lead to a shortfall of at least 40-50 high school teachers per year, during the 1990's.

(iv) size of schools

A further set of results within this third phase of the report, pertains to the issue of school size.

For each of the years 1978-1980, the high school sub-sample was divided into four categories according to size of pupil enrolment. Categories were then compared across a number of variables, to indicate possible consequences of changes in school size upon secondary teacher supply and demand planning. The results suggested that such effects would be minimal.

The expectation that smaller schools would have higher staffing standards was confirmed and by 1980, staffing differences across the categories of school size were largely in accordance with current staffing allocation policies. It was concluded however, that need for increased staff may be at least partly obviated, by the more widespread use of different instructional practices in the smaller schools.

From the viewpoint of subject specialist planning, the main finding was that the smaller the school, the greater the tendency for subject specialisation to break down - at least when the latter variable was measured by the number of subjects taught per teacher. (A similar finding was returned, when district high school staff were compared with high school staff in this regard.) It was stressed,

however, that this apparent breakdown was not to be over-emphasized: by 1980, well over three-quarters of all teachers in all categories of high schools, taught in no more than two subjects.

Size of school bore no discernible relationship to staffing levels per subject category.

(v) pupil-periods

The final component of the report, consisted of a description of the 'pupil-periods' approach to subject specialist demand planning.

As a starting point, a number of possible shortcomings of the subject teacher demand approach previously discussed, were outlined. The pupil-period methodology was then explained in some detail, with data-bases obtained from the high school sub-sample 1978-1980, provided to illustrate its derivation. It was shown for example, that teacher loads expressed in terms of pupil-periods, varied quite consistently across subjects. English teachers had the heaviest loading - followed by Social Science, Mathematics, Science, and Physical Education teachers, each with around 80% the loading of English teachers. Then came Manual Arts teachers (with 65% loading), followed by Home Economics, Commerce, Art and Music teachers, each with around one-third the loading of English teachers.

From this basis, it was postulated that each subject had an optimum pupil-loading. These optimum loadings, which could be considered either absolutely or in relation to overall available staffing resources, were put forward as a fundamental element in the new methodology.

Several advantages of the pupil-period demand planning methodology were suggested, compared with the approach described in the previous phase of the report. One specific advantage was that, as a consequence of its capacity to compare staffing needs across

different subjects, the new methodology would be able to channel additional staffing resources directly into areas of greatest need. A more general advantage arose from the planning flexibility allowed by the pupil-period approach, whereby ready and informed responses could be made to actual or anticipated curricula and other variables. Two specific illustrations were provided in this regard.

It was recognized that the new methodology required a fairly large number of supporting data-bases. It was concluded that its advantages justified this amount of statistical effort.

2 RECOMMENDATIONS FOR FURTHER STUDY

(A) Non-quantitative issues.

Given the nature of this report, the judgment that quantitative estimates of teacher supply and demand have a valuable role to play within teacher planning, should cause little surprise. On the other hand, extended but by no means exhaustive reference has been made to the various dangers risked by any planning approach based exclusively upon quantitative estimates. To achieve full value, it is considered that the latter must be complemented by continued research into all aspects of relevance to teacher functioning.

There is for example, the general need to be always examining in the light of latest experience and developments, traditional educational practices and structures. The very notion of subject specialisation may be instanced in this regard. It has been assumed throughout the report that at a secondary level, subject specialisation is a concept to be maintained and fostered by educational planners. Although support may be drawn from existing personnel practices, from the nature of allocation of teaching duties and from pre-service training provisions, the assumption remains basically untested. The adage that 'teachers should teach children and not subjects', might prove as applicable to the secondary sector as it apparently does to the primary.

Teacher specialisation is not limited to subject specialities. As has been mentioned, a distinction is usually made between primary, secondary, and technical and further education sectors. It is considered to be a rightful concern of teacher planning, to assess the validity of these various distinctions both within schools, and within pre-service and in-service training contexts. Should the distinctions be validated, then a further issue recommended for attention, is the provision of means to maximise teacher versatility so that supply and

demand tuning may be carried out with minimum disruption to the provision of educational services and to the functioning of training institutions.

There is also the general need that quantitative teacher planning keep fully abreast of emerging educational trends and changes.

The present failure of the Tasmanian Department of Education planning model to respond to recent changes in senior secondary education, constitutes a shortcoming in this regard. The amalgamation of most post-compulsory educational programs provided by the Department, into the form of community colleges, has been preceded by quite discernible changes at senior secondary level - whereby emphasis has swung from providing a tertiary-oriented course of education, to a more general concern. Accordingly, over recent years, various subject specialists more commonly found either at junior secondary level or in further education, have been appointed to matriculation colleges. Following the establishment of community colleges in 1980, many of the traditional distinctions between 'secondary' and 'further education' teachers, students and programs, have started to erode. There is the consequent need for the planning model to respond - not only to changes in the levels of various subject specialists - but also to changes in the very type of teachers being appointed to community colleges.

In light of the current teacher supply and demand situation in Tasmania, the continuation of the Department's studentship training scheme also warrants re-examination.

On the one hand, it might be that the current surplus situation justifies its partial disbandment - such that training subsidies be available only to those training in areas of greatest need. Assuming the availability of adequate numbers of additional recruits, either direct from the training institutions or from 'other' sources', this step would allow greater options in matching specialist supply with

demand, year to year. It would also remove much of the four-year time lag which presently hampers the Department's recruitment planning.

On the other hand, prospective teachers' fears of unemployment in an overall surplus situation, could cause them to be diverted to other areas of professional training. Such a trend could change the situation to one of shortage in the near future. Were this the case, the studentship scheme with its informal guarantee of employment, might well halt further flight from the profession.

There are numerous other variables capable of influencing teacher supply and demand, which lie beyond the confines of this report. In-service education - including more frequent release for attendance at training courses and the further transfer of experienced teachers from the classroom to training positions - is one such factor.

It is recommended that whilst quantitative estimates of teacher supply and demand continue to be an integral part of planning activities, emphasis in terms of research activity needs also be given to the complete set of underlying practices, policies and concerns.

(B) Consideration of individual secondary schools.

In order to obtain maximum compatibility with the Tasmanian Department of Education's planning model, the data-bases developed in the report, and the statistical projections derived from them, have commonly been cast at the total Tasmanian State secondary system. On occasions, more specific statistics were presented, pertaining separately to the major types of secondary institutions - district high schools, high schools, and matriculation colleges. Little direct attention has been paid to individual schools - except to indicate the current mechanisms whereby each school principal was able to influence teacher planning and allocation procedures.

It is judged that this disregard of individual schools, has resulted in aspects of relevance to supply and demand planning, being overlooked. It seems for example, that even slight variations in schools' curricula offerings and associated enrolment patterns, could substantially influence both the type and numbers of subject specialists required per school. In view of the probable increase in curricula diversity as the prescriptive authority of the Schools Board of Tasmania becomes reduced, this feature acquires added significance.

To date, there has probably been sufficient homogeneity amongst secondary school to have broadly justified a system approach to planning the supply and demand of subject specialists. In view of impending curricula and structural changes, this may soon cease to be, if subject specialisation persists as a valid planning concept. It is recommended that individual school situations consequently be formally studied from a supply and demand planning viewpoint, possibly within the 'pupil-periods' framework outlined in the report - a recommendation which appears fully feasible, given the relative smallness of the Tasmanian situation.

(C) Aspects of the teacher forecasting model.

The various sources of error which may beset the general type of model used in forecasting and planning teacher supply and demand, have been detailed at some length in the main body of the report. It is tempting to make a broad recommendation of the sort, that future research activity be undertaken to resolve these various uncertainties. Such a recommendation is considered to be unduly unrealistic.

A survey of the literature has shown that future movements in staffing standards, the projection of teacher wastage rates and the projection of pre-service graduation levels, constitute three main possible sources of error. For as long as staffing resources depend

upon political funding decisions, it is difficult to conceive of an alternative methodology likely to yield more reliable estimates than has previously been the case.

The accurate estimation of wastage rates, has proven only slightly more amenable to research. Several studies for example, have broadly pegged wastage to prevailing economic and other conditions. The findings arising from these studies now need updating to respond to the shift, particularly in the overall employment climate. At the more precise level of each individual subject, an attempt has been made in this report to develop the notion of 'theoretical' resignation estimates. Whilst the immediate results proved too unreliable to be incorporated within the supply planning methodology, further research into subject-specific factors affecting resignations, should result in improved reliability.

The projection of new teacher graduates appears most open to further research findings. As has been mentioned, various philosophical and other misgivings aside, the use of quota systems if accepted by training institutions, enables a ceiling to be set upon future graduation levels - leaving assorted variables collectively termed 'market forces' to determine the extent to which the ceilings will be achieved in practice. Further research into related aspects, including the vocational decision-making processes of secondary students as they approach the commencement of tertiary education, should assist in the quantification of the operation of these forces.

A fourth major category of forecasting error, evident most particularly in the AEC Working Party forecasts, concerns prospective teacher recruits from 'other sources'. This area seems almost entirely statistically uncharted. Despite their impact upon the present and projected teacher surplus, estimates of availability of 'other' teachers vary to such an extent across State systems that basic data inadequacy must be suspected.

It is argued that the number of prospective recruits from this source, making themselves available for employment in a given year, is largely unknown - as also is the number who will continue seeking employment as teachers, if not immediately successful in obtaining teacher employment. The suitability of 'other' recruits is also open to question, in view of possibly restricted training qualifications and dated teaching experience, and in view of frequently restricted geographical mobility. Equally importantly from the viewpoint of subject specialist planning, information about subject training and teaching experience remains to be developed.

This need not be so. Most, if not all, 'other' teachers have at some stage been employed by school authorities, and consequently have recorded training and teaching histories. Be it through surveys of select samples of past 'lost' teachers, or from some other basis, data could be relatively readily collected to enable more formal estimates to be made in this area. Given the consequent reliability which would be added to forecasting efforts, such research effort is strongly recommended.

Despite these and other uncertainties associated with the general type of forecasting model described in the main body of the report, the model's continued use has been recommended. A principal justification for its use, is that its estimates are provided within a framework which has made the bulk of underlying assumptions explicit - which estimates consequently, are liable to a fair measure of ongoing checking and monitoring. This quality is not shared by other, less formal forecasting endeavours.

It is recommended that future usage of this type of model - be it applied at the level of an individual State system, as in the case of the Tasmanian Department of Education model, or at an aggregate national level - aims at maintaining, and if possible, enhancing this facility for systematic correction and revision.

It is also recommended that future usage be accompanied by a stronger emphasis upon the uncertainty of the appropriate supply and demand projection. Cautionary statements such as those made by the AEC Working Party, appear unable to cancel the temptation to view the estimates as fairly fixed quantities. The more widespread use of 'high/low' projections would be an alternative strategy to be considered.

A final recommendation to be made in this area, concerns the development of national projections. In view of possible variations in the balance of supply with demand across different educational systems, opinions vary as to whether the national estimates serve a valuable function - with the argument being hinged upon whether there is indeed a national market for school teachers. A study of past patterns of teacher mobility and/or disciplined investigation of future propensity for interstate movement, could cast meaningful light upon this issue.

Without pre-empting the results of such a study, it is strongly recommended that future national forecasts be accompanied by equivalent analysis at each constituent State level. (This has been done in the AEC Working Party forecasts - but not to date, in the later Tertiary Education Commission exercise.)

(D) The need for more extensive data in teacher planning.

The several recommendations made to this point, have largely had as a common theme, the need to develop more extensive data bases. The theme may be extended into virtually all aspects of supply and demand planning.

The exclusive reliance of demand estimates upon the pupil-teacher ratio as the index of conditions in a school system, well illustrates the paucity of information to be found in any formal context. It is

currently assumed that in demand planning, improvements in the pupil-teacher ratio will lead to improvements in the overall learning environment - with any attempt to assess the nature and magnitude of the latter, being totally absent.

The various data established in the report, rightfully should represent only the first step in removing this data paucity.

Further, there are other issues arising from the use of the pupil-teacher ratio, not considered in the report. What specific outcomes are intended from a lowering of the pupil-teacher ratio? Are there specific mechanisms to distribute appropriately, the benefits arising from increased staffing resources? How valid are these mechanisms? How meaningful from a learning viewpoint, are the intentions of a lowered pupil-teacher ratio? Are there alternative ways of improving the learning environment, perhaps less costly than improved staffing standards?

There is also the need to examine and compare within a school system, and within each constituent school, those areas and concerns in greatest need of improvement. The 'pupil-periods' approach to demand planning has been put forward as a useful strategy in this regard, but again, many other issues need to be investigated. Having examined the Tasmanian secondary system, for example, it has emerged that teacher loads (in terms of periods per school cycle) seem to be uniformly distributed across subject categories according to the promotional status of the teacher concerned. Little heed has been paid to the varying demands entailed by the teaching of a subject - demands which may well stretch beyond the confines of the classroom. Loadings defined in terms of pupil-periods, do vary across subjects - with variation more likely due to fluctuations in subject pupil enrolments, rather than to a deliberate policy recognizing different subject requirements. Reliable research findings would be of immense value, in helping determine the most effective deployment of staffing and other resources across areas of school curricula.

Now that educational systems have passed through a period when one of the biggest issues in teacher planning was to ensure adequate recruitment levels, it may be possible for increased research to be expended on these more precise issues of concern.

APPENDIX 1: TWO EXAMPLES OF THE APPLICATION OF THE SECONDARY SCHOOLS STAFFING FORMULA USED FOR HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1979.

Procedure	School 1 Enrolment=450	School 2 Enrolment=750
Determine the senior staff complement		
- principal	1	1
- vice principal	1	2
- senior master	6	9
total	8	12
Determine the staffing index	$450 / 23.3 = 19.3$	$750 / 23.3 = 32.3$
Assign teacher weights to the senior staff supplement		
- principal	$1 \times 0.0 = 0.0$	$1 \times 0.0 = 0.0$
- vice principal	$1 \times 0.4 = 0.4$	$2 \times 0.4 = 0.8$
- senior master	$6 \times 0.6 = 3.6$	$9 \times 0.6 = 5.4$
total	4.0	6.2
Determine the number of base teachers	$19.3 - 4.0 = 15.3$ $15.3 / 0.71 = 21.5$	$32.2 - 6.2 = 26.0$ $26.0 / 0.71 = 36.6$
Determine the number of other staff		
- teacher-librarian	1	1
- lab. technician	1	1
- careers teacher	0.4	0.4
- remedial teacher	1	1
total	3.4	3.4
Total number of staff	33	52
Pupil-teacher ratio	13.6	14.4

Notes:

a. The senior staff profile is determined by size of school enrolment.

b. The parameter value of 23.3 represents the figure needed to distribute the 1979 staff quota. It may be regarded as broadly equivalent to the expected average class size.

c. The figure of 0.71 is the expected base-grade teacher loading.

d. These figures are applicable to all high schools and major district high schools with regard to 'other staff'.

APPENDIX 2: AN EXAMPLE OF THE APPLICATION OF THE SECONDARY SCHOOLS STAFFING FORMULA USED FOR MATRICULATION COLLEGES IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1979.

Procedure	School 1
Pupil enrolments	700
Average number of subjects studied	4.4
Total number of pupil contacts	3080
Senior staff, according to enrolment	
- principal	1
- vice principal	2
- senior master	12
total	15
Non-classroom teachers	
- careers teacher	1
- counsellor	1
- phys. ed. teacher	2
- librarian	2
- lab. technician	2
total	8
Expected pupil contacts for all non-classroom teachers and senior staff	
- principal	$1 \times 0 = 0$
- vice principal	$2 \times 32 = 64$
- senior master	$12 \times 60 = 720$
- careers teacher	$1 \times 40 = 40$
- phys. ed. teacher	$2 \times 20 = 40$
- librarian	$2 \times 0 = 0$
- lab. technician	$2 \times 0 = 0$
total	864
Residual teaching weight	$3080 - 864 = 2216$
Pupil contact load for base teacher	71
Number of additional teachers	$2216 / 71 = 31$
Number of staff	$15 + 8 + 31 = 54$
Pupil-teacher ratio	13.0

APPENDIX 3: THE CLASSIFICATION OF JUNIOR SECONDARY SUBJECTS
USED IN THE REPORT COMPARED WITH THE CLASSIFICATION OF SUBJECTS
MADE BY THE SCHOOLS BOARD OF TASMANIA, 1978-1980.

Schools Board Classification	Report Classification
English Speech and Drama	English
Geography History Social Science	Social Science
Mathematics	Mathematics
Biology Chemistry Physics Rural Science Science	Science
Physical Education P. E. Studies	Physical Education
Metalwork Technical Drawing Technology Woodwork	Manual Arts
Home Arts, Crafts Home Economics	Home Economics
Commercial Knowledge Commercial Practice Shorthand Typing	Commerce
Art Visual Arts	Art
Music	Music
French	French
German	German

APPENDIX 3: (continued)

Computer Studies Indonesian Italian Japanese Latin Religious Studies Plus: assorted school-based subjects	Miscellaneous
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APPENDIX 4: THE CLASSIFICATION OF SENIOR SECONDARY SUBJECTS
USED IN THE REPORT COMPARED WITH THE CLASSIFICATION OF SUBJECTS
MADE BY THE SCHOOLS BOARD OF TASMANIA, 1978-1980.

Schools Board Classification	Report Classification
English English Literature English Studies European Literature Speech and Drama	English
Ancient History Asian History Australian History British History General History Geography	Social Science
Mathematics	Mathematics
Biology Chemistry Environmental Science Geology Physics Rural Science Science	Science
Physical Education	Physical Education
Art Crafts	Art
Music	Music
French	French
German	German
Accountancy Economics	Business Studies
Social Psychology	Social Psychology

APPENDIX 4: (continued)

Computer Studies Dutch General Studies Home Economics Indonesian Italian Japanese Latin Religious Studies Secretarial Studies Shorthand Stenography Technical Drawing Technology Typing Plus: assorted school-based subjects	Miscellaneous
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APPENDIX 5: AVERAGE NUMBER OF PERIODS TAUGHT BY TEACHERS OF SELECT SUBJECTS OR SUBJECT-COMBINATIONS IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978.

Subjects	Number of periods taught							
	School							
	1	2	3	4	5	6	7	8
English	22.0	23.0	-	22.4	-	20.7	-	-
English/Social Sci	23.6	21.5	21.6	23.2	-	21.1	21.9	24.6
Social Science	-	22.7	-	22.0	-	-	21.9	-
Mathematics	24.0	24.0	22.3	23.8	-	24.0	21.6	22.7
Maths/Science	23.8	24.0	22.3	24.5	22.5	24.0	22.3	23.2
Science	24.0	24.0	22.3	24.0	22.5	24.0	17.5	23.4
Physical Education	23.0	24.0	22.7	22.0	-	21.3	20.6	21.2
Manual Arts	23.4	23.3	22.3	21.8	21.8	23.5	21.3	24.3
Home Economics	24.0	-	24.8	23.5	22.5	22.5	23.4	26.3
Commerce	24.0	22.0	21.0	18.7	22.5	22.0	18.9	22.0
Art	24.0	24.0	22.7	23.5	22.5	20.0	19.6	23.9
Music	22.5	24.0	24.8	20.0	-	18.5	23.8	21.6
Miscellaneous	-	-	26.3	-	-	-	-	-
No. of teachers	31	24	26	36	13	33	27	33
Mean no. of periods	23.5	23.0	23.0	22.5	22.4	22.2	21.4	23.6

APPENDIX 5 (continued)

Subj.	Number of periods taught										
	School										
	9	10	11	12	13	14	15	16	17	18	19
Eng	21.3	22.1	-	-	20.3	21.8	-	20.7	21.0	-	-
E/SS	18.2	20.3	22.5	21.2	22.0	21.5	22.3	21.3	19.0	22.9	24.0
SS	20.0	24.3	18.0	-	22.5	23.3	-	-	23.5	-	23.5
Maths	22.0	22.9	22.5	-	-	15.0	20.7	-	24.0	23.7	24.0
Ma/Sc	20.7	23.6	22.7	24.0	22.2	22.2	23.6	21.6	23.0	23.7	24.0
Sci	-	-	-	-	-	-	23.6	-	24.0	-	23.0
PE	19.0	21.0	22.9	24.0	21.0	22.5	23.6	21.8	22.0	-	24.5
M/A	20.3	20.6	21.0	-	24.9	24.0	23.6	22.3	20.7	-	23.5
H Ec	21.5	-	21.8	20.2	21.0	-	-	-	-	25.3	22.7
Comm	22.5	21.4	21.4	23.0	23.3	-	24.1	20.7	21.0	-	-
Art	21.3	-	17.6	23.7	24.0	23.3	22.5	-	-	-	23.0
Mus	21.0	24.3	19.9	23.5	21.8	-	24.6	25.0	23.0	23.7	24.0
Misc	25.0	-	-	-	-	-	26.8	19.3	23.5	-	-
Tchrs	41	25	30	29	30	22	21	23	20	7	23
Load	20.6	21.7	21.6	22.4	22.2	22.1	23.0	21.6	22.4	23.8	23.6

APPENDIX 5 (continued)

Subj.	Number of subjects taught									Mean Load	No. Tchrs
	School										
	20	21	22	23	24	25	26	27	28		
Eng	23.0	20.5	24.0	24.0	-	-	23.0	-	-	21.9	32
E/SS	22.5	22.1	23.0	24.3	22.0	23.1	24.0	-	22.0	22.0	107
SS	-	-	24.0	24.0	-	-	-	-	-	22.5	18
Maths	22.5	-	24.0	24.0	23.4	-	-	-	18.0	22.7	33
Ma/Sc	22.5	22.1	24.0	24.0	23.0	23.2	24.0	21.7	-	22.9	121
Sci	-	22.9	24.0	-	-	-	24.0	-	-	23.2	23
P E	20.6	21.1	24.0	24.0	23.4	22.6	20.0	-	-	21.9	49
M/A	22.9	19.5	24.0	24.0	23.4	24.3	24.0	23.6	17.8	22.5	92
H Ec	22.5	18.2	24.0	24.0	20.6	22.2	24.0	-	-	22.5	48
Comm	22.5	22.9	24.0	24.6	23.4	22.6	23.0	-	-	22.0	34
Art	22.5	-	23.0	24.6	23.4	22.2	22.0	-	-	22.5	41
Mus	22.5	20.0	22.0	25.2	23.4	-	24.0	-	-	22.5	33
Misc	22.5	-	-	-	-	-	-	-	-	24.1	8
Tchrs Load	23 22.5	20 21.0	24 23.7	28 24.3	17 22.9	11 23.2	14 23.1	3 20.4	5 20.4		639

Source: based upon principals' annual staffing returns.

Notes:

- a. Only base-grade teachers have been included.
- b. Period statistics standardized to represent a 30-period cycle.

APPENDIX 6: AVERAGE NUMBER OF PERIODS TAUGHT BY TEACHERS IN SELECT SUBJECTS OR SUBJECT-COMBINATIONS IN THE SUB-SAMPLE OF MATRICULATION COLLEGES IN THE TASMANIAN DEPARTMENT OF EDUCATION, 1978.

Subjects	Number of periods taught						
	College						
	1	2	3	4	5	Mean Load	No. Tchrs
English	15.0	12.5	15.0	12.5	14.4	13.8	19
English/Social Sci	15.0	-	15.0	-	15.0	15.0	4
Social Science	15.0	15.0	12.5	15.0	13.0	13.9	19
Mathematics	15.0	15.0	13.9	13.3	16.7	14.7	11
Maths/Science	15.0	13.3	15.0	15.0	16.3	14.7	9
Science	16.0	15.0	12.1	14.4	14.4	14.2	33
Physical Education	20.0	5.0	-	15.0	-	13.3	3
Art	15.0	15.0	15.0	12.5	15.0	14.4	8
Music	-	-	10.0	10.0	-	10.0	2
Social Psychology	15.0	10.0	15.0	15.0	15.0	14.2	13
Business Studies	15.0	15.0	13.3	15.0	15.0	14.4	8
Miscellaneous	-	-	15.0	20.0	16.7	17.0	5
No. of teachers	19	16	30	35	34		134
Mean no. of periods	15.5	13.2	13.6	14.2	14.7	14.3	

Source: based upon principals' annual staffing returns.

Notes:

a. Only base-grade teachers and senior masters have been included.

b. Periods standardized to represent a 25-period cycle.

APPENDIX 7: FULL-TIME EQUIVALENT TEACHER NUMBERS PER SUBJECT
IN THE SAMPLE OF SECONDARY SCHOOLS IN THE TASMANIAN DEPARTMENT
OF EDUCATION, 1978, 1979 AND 1980.

Subjects	Number of teachers								
	1978			1979			1980		
	Dist High Matr			Dist High Matr			Dist High Matr		
English	19	188	30	22	189	36	21	196	37
Social Science	13	141	29	15	141	26	17	141	28
Mathematics	19	161	20	20	157	24	20	154	27
Science	15	145	50	17	142	54	18	145	59
Physical Educatn	5	83	9	6	83	9	8	90	7
Manual Arts	19	152	-	21	153	-	21	145	-
Home Economics	15	96	-	15	95	-	15	102	-
Commerce	6	71	-	6	70	-	7	67	-
Art	8	84	10	8	83	11	9	79	14
Music	2	55	4	2	56	3	3	58	5
French	5	32	3	4	28	3	5	29	3
German	1	14	2	-	13	2	-	13	3
Business Studies	-	-	11	-	-	11	-	-	12
Social Psycholgy	-	-	16	-	-	12	-	-	17
Miscellaneous	5	65	24	4	97	28	5	100	37
Total	132	1287	208	140	1307	219	149	1319	249

Source: based upon principals' annual staffing returns.

Notes:

a. Any discrepancy between totals and constituent scores due to rounding.

APPENDIX 8: RESIGNATIONS PER SUBJECT AS
A PROPORTION OF ALL TEACHERS PER SUBJECT
IN THE SUB-SAMPLE OF HIGH SCHOOLS IN THE
TASMANIAN DEPARTMENT OF EDUCATION, 1978
AND 1979.

Subjects	Resignations			
	1978		1979	
	No.	%	No.	%
English	18.2	9.7	7.1	3.8
Social Science	10.8	7.7	6.0	4.3
Mathematics	8.4	5.2	7.1	4.5
Science	8.9	6.1	8.7	6.1
Physical Education	7.1	8.6	5.8	7.0
Manual Arts	6.0	3.9	2.1	1.4
Home Economics	6.2	6.5	3.9	4.1
Commerce	4.1	5.8	1.0	1.4
Art	6.5	7.7	1.6	1.9
Music	9.3	16.9	1.2	2.1
French	2.1	6.6	1.3	4.6
German	1.1	7.9	1.2	9.2
Miscellaneous	6.3	9.7	8.0	8.2
All Teachers	95.0	7.4	55.0	4.2

Source: based upon principals' annual
staffing returns and Personnel Office
resignation schedules.

Notes:

a. All statistics are in full-time
equivalent terms.

b. Any discrepancy between totals and
constituent scores due to rounding.

APPENDIX 9: MALE TEACHERS PER SUBJECT
AS A PERCENTAGE OF ALL TEACHERS PER
SUBJECT IN THE SAMPLE OF SECONDARY
SCHOOLS IN THE TASMANIAN DEPARTMENT OF
EDUCATION, 1978, 1979 AND 1980.

Subject	Masculinity		
	1978	1979	1980
English	38.2	39.8	44.2
Social Science	61.2	58.8	62.0
Mathematics	77.3	77.1	78.1
Science	81.0	81.2	79.3
Physical Education	47.7	55.2	56.1
Manual Arts	99.4	100.0	100.0
Home Economics	0.0	0.0	0.8
Commerce	22.5	22.9	23.2
Art	39.7	46.7	45.6
Music	50.9	44.6	48.3
French	28.1	25.0	24.1
German	28.6	23.1	38.5
Business Studies	72.7	90.9	91.7
Social Psychology	75.0	66.7	64.7
Miscellaneous	52.9	52.7	54.7
All Teachers	57.1	57.6	58.1

Source: based upon principals' annual
staffing returns.

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